

# Package ‘OmnipathR’

March 29, 2022

**Type** Package

**Title** OmniPath web service client and more

**Version** 3.2.8

**Description** A client for the OmniPath web service (<https://www.omnipathdb.org>) and many other resources. It also includes functions to transform and pretty print some of the downloaded data, functions to access a number of other resources such as BioPlex, ConsensusPathDB, EVEX, Gene Ontology, Guide to Pharmacology (IUPHAR/BPS), Harmonizome, HTRIdb, Human Phenotype Ontology, InWeb InBioMap, KEGG Pathway, Pathway Commons, Ramilowski et al. 2015, RegNetwork, ReMap, TF census, TRRUST and Vinayagam et al. 2011. Furthermore, OmnipathR features a close integration with the NicheNet method for ligand activity prediction from transcriptomics data, and its R implementation `nichenetr` (available only on github).

**License** MIT + file LICENSE

**URL** <https://saezlab.github.io/OmnipathR/>

**BugReports** <https://github.com/saezlab/OmnipathR/issues>

**biocViews** GraphAndNetwork, Network, Pathways, Software, ThirdPartyClient, DataImport, DataRepresentation, GeneSignaling, GeneRegulation, SystemsBiology, Transcriptomics, SingleCell, Annotation, KEGG

**Encoding** UTF-8

**VignetteBuilder** knitr

**Depends** R(>= 4.0)

**Imports** checkmate, crayon, curl, digest, dplyr, httr, igraph, jsonlite, later, logger, magrittr, progress, purrr, rappdirs, readr(>= 2.0.0), readxl, rlang, stats, stringr, tibble, tidyr, tidyselect, tools, utils, xml2, yaml

**Suggests** BiocStyle, dnet, ggplot2, ggraph, gprofiler2, knitr, mlrMBO, parallelMap, ParamHelpers, Rgraphviz, rmarkdown, smooof, supraHex, testthat

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---

```
.omnipath_options_defaults
```

*Default values for the package options*

---

### Description

These options describe the default settings for OmnipathR so you do not need to pass these parameters at each function call. Currently the only option useful for the public web service at `omnipathdb.org` is `omnipath.license`. If you are a for-profit user set it to `commercial` to make sure all the data you download from OmniPath is legally allowed for commercial use. Otherwise just leave it as it is: `academic`. If you don't use `omnipathdb.org` but within your organization you deployed your own pypath server and want to share data with a limited availability to outside users, you may want to use a password. For this you can use the `omnipath.password` option. Also if you want the R package to work from another pypath server instead of `omnipathdb.org`, you can change the option `omnipath.url`.

### Usage

```
.omnipath_options_defaults
```

### Format

An object of class `list` of length 13.

---

```
all_uniprots
```

*A table with all UniProt IDs*

---

### Description

Retrieves a table from UniProt with all proteins for a certain organism.

### Usage

```
all_uniprots(fields = "id", reviewed = TRUE, organism = 9606)
```

### Arguments

<code>fields</code>	Character vector of fields as defined by UniProt. For possible values please refer to <a href="https://www.uniprot.org/help/uniprotkb%5Fcolumn%5Fnames">https://www.uniprot.org/help/uniprotkb%5Fcolumn%5Fnames</a>
<code>reviewed</code>	Retrieve only reviewed ('TRUE'), only unreviewed ('FALSE') or both ('NULL').
<code>organism</code>	Integer, NCBI Taxonomy ID of the organism (by default 9606 for human).

### Value

Data frame (tibble) with the requested UniProt entries and fields.

## Examples

```
human_swissprot_ac <- all_uniprots(fields = 'entry name')
human_swissprot_ac
# # A tibble: 20,396 x 1
#   `Entry name`
#   <chr>
# 1 OR4K3_HUMAN
# 2 O52A1_HUMAN
# 3 O2AG1_HUMAN
# 4 O10S1_HUMAN
# 5 O11G2_HUMAN
# # . with 20,386 more rows
```

---

ancestors

*All ancestors in the ontology tree*

---

## Description

Starting from the selected nodes, recursively walks the ontology tree until it reaches the root. Collects all visited nodes, which are the ancestors (parents) of the starting nodes.

## Usage

```
ancestors(
  terms,
  db_key = "go_basic",
  ids = TRUE,
  relations = c("is_a", "part_of", "occurs_in", "regulates", "positively_regulates",
               "negatively_regulates")
)
```

## Arguments

terms	Character vector of ontology term IDs or names. A mixture of IDs and names can be provided.
db_key	Character: key to identify the ontology database. For the available keys see <a href="#">omnipath_show_db</a> .
ids	Logical: whether to return IDs or term names.
relations	Character vector of ontology relation types. Only these relations will be used.

## Details

Note: this function relies on the database manager, the first call might take long because of the database load process. Subsequent calls within a short period should be faster. See [get\\_ontology\\_db](#).

**Value**

Character vector of ontology IDs. If the input terms are all root nodes, NULL is returned. The starting nodes won't be included in the result unless some of them are ancestors of other starting nodes.

**Examples**

```
ancestors('GO:0005035', ids = FALSE)
# [1] "molecular_function"
# [2] "transmembrane signaling receptor activity"
# [3] "signaling receptor activity"
# [4] "molecular transducer activity"
```

---

annotated\_network      *Network interactions with annotations*

---

**Description**

Annotations are often useful in a network context, e.g. one might want to label the interacting partners by their pathway membership. This function takes a network data frame and joins an annotation data frame from both the left and the right side, so both the source and target molecular entities will be labeled by their annotations. If one entity has many annotations these will yield many rows, hence the interacting pairs won't be unique across the data frame any more. Also if one entity has really many annotations the resulting data frame might be huge, we recommend to be careful with that. Finally, if you want to do the same but with intercell annotations, there is the [import\\_intercell\\_network](#) function.

**Usage**

```
annotated_network(network = NULL, annot = NULL, ...)
```

**Arguments**

network	Behaviour depends on type: if list, will be passed as arguments to <a href="#">import_omnipath_interactions</a> to obtain a network data frame; if a data frame or tibble, it will be used as a network data frame; if a character vector, will be assumed to be a set of resource names and interactions will be queried from these resources.
annot	Either the name of an annotation resource (for a list of available resources call <a href="#">get_annotation_resources</a> ), or an annotation data frame. If the data frame contains more than one resources, only the first one will be used.
...	Column names selected from the annotation data frame (passed to <code>dplyr::select</code> , if empty all columns will be selected.)

**Value**

A data frame of interactions with annotations for both interacting entities.



**Examples**

```
signalink_with_pathways <-
  annotated_network('Signalink3', 'Signalink_pathway')
```

---

annotation\_categories *Annotation categories and resources*

---

**Description**

A full list of annotation resources, keys and values.

**Usage**

```
annotation_categories()
```

**Value**

A data frame with resource names, annotation key labels and for each key all possible values.

**Examples**

```
annot_cat <- annotation_categories()
annot_cat
# # A tibble: 46,307 x 3
#   source      label  value
#   <chr>      <chr> <chr>
# 1 connectomeDB2020 role    ligand
# 2 connectomeDB2020 role    receptor
# 3 connectomeDB2020 location ECM
# 4 connectomeDB2020 location plasma membrane
# 5 connectomeDB2020 location secreted
# 6 KEGG-PC      pathway Alanine, aspartate and glutamate metabolism
# 7 KEGG-PC      pathway Amino sugar and nucleotide sugar metabolism
# 8 KEGG-PC      pathway Aminoacyl-tRNA biosynthesis
# 9 KEGG-PC      pathway Arachidonic acid metabolism
# 10 KEGG-PC     pathway Arginine and proline metabolism
```

---

`bioplex1`*Downloads the BioPlex version 1.0 interaction dataset*

---

**Description**

This dataset contains ~24,000 interactions detected in HEK293T cells using 2,594 baits. More details at <https://bioplex.hms.harvard.edu/interactions.php>.

**Usage**`bioplex1()`**Value**

Data frame (tibble) with interactions.

**See Also**

- [bioplex2](#)
- [bioplex3](#)
- [bioplex\\_hct116\\_1](#)
- [bioplex\\_all](#)

**Examples**

```
bioplex_interactions <- bioplex1()
nrow(bioplex_interactions)
# [1] 23744
colnames(bioplex_interactions)
# [1] "GeneA"      "GeneB"      "UniprotA"   "UniprotB"
# [5] "SymbolA"    "SymbolB"    "p_wrong"    "p_no_interaction"
# [9] "p_interaction"
```

---

`bioplex2`*Downloads the BioPlex version 2.0 interaction dataset*

---

**Description**

This dataset contains ~56,000 interactions detected in HEK293T cells using 5,891 baits. More details at <https://bioplex.hms.harvard.edu/interactions.php>

**Usage**`bioplex2()`

**Value**

Data frame (tibble) with interactions.

**See Also**

- [bioplex1](#)
- [bioplex3](#)
- [bioplex\\_hct116\\_1](#)
- [bioplex\\_all](#)

**Examples**

```
bioplex_interactions <- bioplex2()
nrow(bioplex_interactions)
# [1] 56553
colnames(bioplex_interactions)
# [1] "GeneA"      "GeneB"      "UniprotA"   "UniprotB"
# [5] "SymbolA"    "SymbolB"    "p_wrong"    "p_no_interaction"
# [9] "p_interaction"
```

---

bioplex3

*Downloads the BioPlex version 3.0 interaction dataset*

---

**Description**

This dataset contains ~120,000 interactions detected in HEK293T cells using 10,128 baits. More details at <https://bioplex.hms.harvard.edu/interactions.php>.

**Usage**

```
bioplex3()
```

**Value**

Data frame (tibble) with interactions.

**See Also**

- [bioplex1](#)
- [bioplex2](#)
- [bioplex\\_hct116\\_1](#)
- [bioplex\\_all](#)

## Examples

```
bioplex_interactions <- bioplex3()
nrow(bioplex_interactions)
# [1] 118162
colnames(bioplex_interactions)
# [1] "GeneA"      "GeneB"      "UniprotA"   "UniprotB"
# [5] "SymbolA"    "SymbolB"    "p_wrong"    "p_no_interaction"
# [9] "p_interaction"
```

---

bioplex\_all

*Downloads all BioPlex interaction datasets*

---

## Description

BioPlex provides four interaction datasets: version 1.0, 2.0, 3.0 and HCT116 version 1.0. This function downloads all of them, merges them to one data frame, removes the duplicates (based on unique pairs of UniProt IDs) and separates the isoform numbers from the UniProt IDs. More details at <https://bioplex.hms.harvard.edu/interactions.php>.

## Usage

```
bioplex_all(unique = TRUE)
```

## Arguments

unique	Logical. Collapse the duplicate interactions into single rows or keep them as they are. In case of merging duplicate records the maximum p value will be chosen for each record.
--------	--

## Value

Data frame (tibble) with interactions.

## See Also

- [bioplex1](#)
- [bioplex2](#)
- [bioplex3](#)
- [bioplex\\_hct116\\_1](#)

**Examples**

```

bioplex_interactions <- bioplex_all()
bioplex_interactions
# # A tibble: 195,538 x 11
#   UniprotA IsoformA UniprotB IsoformB GeneA GeneB SymbolA SymbolB
#   <chr>      <int> <chr>      <int> <dbl> <dbl> <chr>   <chr>
# 1 A0AV02      2 Q5K4L6      NA 84561 11000 SLC12A8 SLC27A3
# 2 A0AV02      2 Q8N5V2      NA 84561 25791 SLC12A8 NGEF
# 3 A0AV02      2 Q9H6S3      NA 84561 64787 SLC12A8 EPS8L2
# 4 A0AV96      2 O00425      2 54502 10643 RBM47   IGF2BP3
# 5 A0AV96      2 O00443      NA 54502 5286 RBM47   PIK3C2A
# 6 A0AV96      2 O43426      NA 54502 8867 RBM47   SYNJ1
# 7 A0AV96      2 O75127      NA 54502 26024 RBM47   PTC1D1
# 8 A0AV96      2 O95208      2 54502 22905 RBM47   EPN2
# 9 A0AV96      2 O95900      NA 54502 26995 RBM47   TRUB2
# 10 A0AV96     2 P07910      2 54502 3183 RBM47   HNRNPC
# # . with 195,528 more rows, and 3 more variables: p_wrong <dbl>,
# #   p_no_interaction <dbl>, p_interaction <dbl>

```

---

bioplex\_hct116\_1

*Downloads the BioPlex HCT116 version 1.0 interaction dataset*


---

**Description**

This dataset contains ~71,000 interactions detected in HCT116 cells using 5,522 baits. More details at <https://bioplex.hms.harvard.edu/interactions.php>.

**Usage**

```
bioplex_hct116_1()
```

**Value**

Data frame (tibble) with interactions.

**See Also**

- [bioplex1](#)
- [bioplex2](#)
- [bioplex3](#)
- [bioplex\\_all](#)

## Examples

```
bioplex_interactions <- bioplex_hct116_1()
nrow(bioplex_interactions)
# [1] 70966
colnames(bioplex_interactions)
# [1] "GeneA"      "GeneB"      "UniprotA"   "UniprotB"
# [5] "SymbolA"    "SymbolB"    "p_wrong"    "p_no_interaction"
# [9] "p_interaction"
```

---

bma\_motif\_es

*BMA motifs from a sequence of edges*

---

## Description

These motifs can be added to a BMA canvas.

## Usage

```
bma_motif_es(edge_seq, G, granularity = 2)
```

## Arguments

edge_seq	An igraph edge sequence.
G	An igraph graph object.
granularity	Numeric: granularity value.

## Value

Character: BMA motifs as a single string.

## Examples

```
interactions <- import_omnipath_interactions(resources = 'ARN')
graph <- interaction_graph(interactions)
motifs <- bma_motif_es(igraph::E(graph)[1], graph)
```

---

bma_motif_vs	<i>Prints a BMA motif to the screen from a sequence of nodes, which can be copy/pasted into the BMA canvas</i>
--------------	--

---

**Description**

Intended to parallel print\_path\_vs

**Usage**

```
bma_motif_vs(node_seq, G)
```

**Arguments**

node_seq	An igraph node sequence.
G	An igraph graph object.

**Value**

Character: BMA motifs as a single string.

**Examples**

```
interactions <- import_omnipath_interactions(resources = 'ARN')
graph <- interaction_graph(interactions)
bma_string <- bma_motif_vs(
  igraph::all_shortest_paths(
    graph,
    from = 'ULK1',
    to = 'ATG13'
  )$res,
  graph
)
```

---

consensuspathdb_download
--------------------------

*Retrieves the ConsensusPathDB network*

---

**Description**

Compiles a table of binary interactions from ConsensusPathDB (<http://cpdb.molgen.mpg.de/>) and translates the UniProtKB ACs to Gene Symbols.

**Usage**

```
consensuspathdb_download(complex_max_size = 4, min_score = 0.9)
```

**Arguments**

complex_max_size	Numeric: do not expand complexes with a higher number of elements than this. ConsensusPathDB does not contain conventional interactions but lists of participants, which might be members of complexes. Some records include dozens of participants and expanding them to binary interactions result thousands, sometimes hundreds of thousands of interactions from one single record. At the end, this process consumes >10GB of memory and results rather unusable data, hence it is recommended to limit the complex sizes at some low number.
min_score	Numeric: each record in ConsensusPathDB comes with a confidence score, expressing the amount of evidences. The default value, a minimum score of 0.9 retains approx. the top 30 percent of the interactions.

**Value**

Data frame (tibble) with interactions.

**Examples**

```
## Not run:
cpdb_data <- consensuspathdb_download(
  complex_max_size = 1,
  min_score = .99
)
nrow(cpdb_data)
# [1] 252302
colnames(cpdb_data)
# [1] "databases" "references" "uniprot_a" "confidence" "record_id"
# [6] "uniprot_b" "in_complex" "genesymbol_a" "genesymbol_b"
cpdb_data
## # A tibble: 252,302 x 9
##   databases references uniprot_a confidence record_id uniprot_b in_com
##   <chr>      <chr>      <chr>      <dbl>      <int> <chr>      <lgl>
## 1 Reactome NA          SUMF2_HU.    1           1 SUMF1_HU. TRUE
## 2 Reactome NA          SUMF1_HU.    1           1 SUMF2_HU. TRUE
## 3 DIP,Reac. 22210847,. STIM1_HU.    0.998       2 TRPC1_HU. TRUE
## 4 DIP,Reac. 22210847,. TRPC1_HU.    0.998       2 STIM1_HU. TRUE
## # . with 252,292 more rows, and 2 more variables: genesymbol_a <chr>,
## #   genesymbol_b <chr>

## End(Not run)
```

---

consensuspathdb\_raw\_table

*Downloads interaction data from ConsensusPathDB*

---



**Description**

Downloads interaction data from ConsensusPathDB

**Usage**

```
consensuspathdb_raw_table()
```

**Value**

Data frame (tibble) with interactions.

**Examples**

```
cpdb_raw <- consensuspathdb_raw_table()
```

---

descendants

*All descendants in the ontology tree*

---

**Description**

Starting from the selected nodes, recursively walks the ontology tree until it reaches the leaf nodes. Collects all visited nodes, which are the descendants (children) of the starting nodes.

**Usage**

```
descendants(  
  terms,  
  db_key = "go_basic",  
  ids = TRUE,  
  relations = c("is_a", "part_of", "occurs_in", "regulates", "positively_regulates",  
               "negatively_regulates")  
)
```

**Arguments**

terms	Character vector of ontology term IDs or names. A mixture of IDs and names can be provided.
db_key	Character: key to identify the ontology database. For the available keys see <a href="#">omnipath_show_db</a> .
ids	Logical: whether to return IDs or term names.
relations	Character vector of ontology relation types. Only these relations will be used.

**Details**

Note: this function relies on the database manager, the first call might take long because of the database load process. Subsequent calls within a short period should be faster. See [get\\_ontology\\_db](#).

**Value**

Character vector of ontology IDs. If the input terms are all leaves NULL is returned. The starting nodes won't be included in the result unless some of them are descendants of other starting nodes.

**Examples**

```
descendants('GO:0005035', ids = FALSE)
# [1] "tumor necrosis factor-activated receptor activity"
# [2] "TRAIL receptor activity"
# [3] "TNFSF11 receptor activity"
```

---

enzsub_graph	<i>Enzyme-substrate graph</i>
--------------	-------------------------------

---

**Description**

Transforms the a data frame with enzyme-substrate relationships (obtained by [import\\_omnipath\\_enzsub](#)) to an igraph graph object.

**Usage**

```
enzsub_graph(enzsub)
```

**Arguments**

enzsub            Data frame created by [import\\_omnipath\\_enzsub](#)

**Value**

An igraph directed graph object.

**See Also**

- [import\\_omnipath\\_enzsub](#)
- [giant\\_component](#)
- [find\\_all\\_paths](#)

**Examples**

```
enzsub <- import_omnipath_enzsub(resources = c('PhosphoSite', 'SIGNOR'))
enzsub_g <- enzsub_graph(enzsub = enzsub)
```

---

evex\_download                      *Interactions from the EVEX database*

---

## Description

Downloads interactions from EVEX, a versatile text mining resource (<http://evexdb.org>). Translates the Entrez Gene IDs to Gene Symbols and combines the interactions and references into a single data frame.

## Usage

```
evex_download(
  min_confidence = NULL,
  remove_negatives = TRUE,
  top_confidence = NULL
)
```

## Arguments

**min\_confidence** Numeric: a threshold for confidence scores. EVEX confidence scores span roughly from -3 to 3. By providing a numeric value in this range the lower confidence interactions can be removed. If NULL no filtering performed.

**remove\_negatives** Logical: remove the records with the "negation" attribute set.

**top\_confidence** Confidence cutoff as quantile (a number between 0 and 1). If NULL no filtering performed.

## Value

Data frame (tibble) with interactions.

## Examples

```
evex_interactions <- evex_download()
evex_interactions
# # A tibble: 368,297 x 13
#   general_event_id source_entrezge. target_entrezge. confidence negation
#   <dbl> <chr> <chr> <dbl> <dbl>
# 1     98 8651     6774     -1.45     0
# 2    100 8431     6774     -1.45     0
# 3    205 6261     6263     0.370     0
# 4    435 1044     1045     -1.09     0
# . with 368,287 more rows, and 8 more variables: speculation <dbl>,
#   coarse_type <chr>, coarse_polarity <chr>, refined_type <chr>,
#   refined_polarity <chr>, source_genesymbol <chr>,
#   target_genesymbol <chr>, references <chr>
```

filter\_by\_resource      *Filters OmniPath data by resources*

---

### Description

Keeps only those records which are supported by any of the resources of interest.

### Usage

```
filter_by_resource(data, resources = NULL)
```

### Arguments

data	A data frame downloaded from the OmniPath web service (interactions, enzyme-substrate or complexes).
resources	Character vector with resource names to keep.

### Value

The data frame filtered.

### Examples

```
interactions <- import_omnipath_interactions()
signor <- filter_by_resource(interactions, resources = 'SIGNOR')
```

---

filter\_intercell\_network  
*Quality filter an intercell network*

---

### Description

The intercell database of OmniPath covers a very broad range of possible ways of cell to cell communication, and the pieces of information, such as localization, topology, function and interaction, are combined from many, often independent sources. This unavoidably result some weird and unexpected combinations which are false positives in the context of intercellular communication. [import\\_intercell\\_network](#) provides a shortcut (high\_confidence) to do basic quality filtering. For custom filtering or experimentation with the parameters we offer this function.

**Usage**

```

filter_intercell_network(
  network,
  transmitter_topology = c("secreted", "plasma_membrane_transmembrane",
    "plasma_membrane_peripheral"),
  receiver_topology = "plasma_membrane_transmembrane",
  min_curation_effort = 2,
  min_resources = 1,
  min_references = 0,
  min_provenances = 1,
  consensus_percentile = 50,
  loc_consensus_percentile = 30,
  ligand_receptor = FALSE,
  simplify = FALSE,
  unique_pairs = FALSE,
  omnipath = TRUE,
  ligreextra = TRUE,
  kinaseextra = FALSE,
  pathwayextra = FALSE,
  ...
)

```

**Arguments**

network	An intercell network data frame, as provided by <a href="#">import_intercell_network</a> , without simplify.
transmitter_topology	Character vector: topologies allowed for the entities in transmitter role. Abbreviations allowed: "sec", "pmtm" and "pmp".
receiver_topology	Same as transmitter_topology for the entities in the receiver role.
min_curation_effort	Numeric: a minimum value of curation effort (resource-reference pairs) for network interactions. Use zero to disable filtering.
min_resources	Numeric: minimum number of resources for interactions. The value 1 means no filtering.
min_references	Numeric: minimum number of references for interactions. Use zero to disable filtering.
min_provenances	Numeric: minimum number of provenances (either resources or references) for interactions. Use zero or one to disable filtering.
consensus_percentile	Numeric: percentile threshold for the consensus score of generic categories in intercell annotations. The consensus score is the number of resources supporting the classification of an entity into a category based on combined information of many resources. Here you can apply a cut-off, keeping only the annotations supported by a higher number of resources than a certain percentile of each

category. If NULL no filtering will be performed. The value is either in the 0-1 range, or will be divided by 100 if greater than 1. The percentiles will be calculated against the generic composite categories and then will be applied to their resource specific annotations and specific child categories.

loc_consensus_percentile	Numeric: similar to consensus_percentile for major localizations. For example, with a value of 50, the secreted, plasma membrane transmembrane or peripheral attributes will be TRUE only where at least 50 percent of the resources support these.
ligand_receptor	Logical. If TRUE, only <i>ligand</i> and <i>receptor</i> annotations will be used instead of the more generic <i>transmitter</i> and <i>receiver</i> categories.
simplify	Logical: keep only the most often used columns. This function combines a network data frame with two copies of the intercell annotation data frames, all of them already having quite some columns. With this option we keep only the names of the interacting pair, their intercellular communication roles, and the minimal information of the origin of both the interaction and the annotations.
unique_pairs	Logical: instead of having separate rows for each pair of annotations, drop the annotations and reduce the data frame to unique interacting pairs. See <a href="#">unique_intercell_network</a> for details.
omnipath	Logical: shortcut to include the <i>omnipath</i> dataset in the interactions query.
ligreextra	Logical: shortcut to include the <i>ligreextra</i> dataset in the interactions query.
kinaseextra	Logical: shortcut to include the <i>kinaseextra</i> dataset in the interactions query.
pathwayextra	Logical: shortcut to include the <i>pathwayextra</i> dataset in the interactions query.
...	If simplify or unique_pairs is TRUE, additional column names can be passed here to <code>dplyr::select</code> on the final data frame. Otherwise ignored.

### Value

An intercell network data frame filtered.

### See Also

- [import\\_intercell\\_network](#)
- [unique\\_intercell\\_network](#)
- [simplify\\_intercell\\_network](#)

### Examples

```
icn <- import_intercell_network()
icn_f <- filter_intercell_network(
  icn,
  consensus_percentile = 75,
  min_provenances = 3,
  simplify = TRUE
)
```

---

find_all_paths	<i>All paths between two groups of vertices</i>
----------------	---

---

### Description

Finds all paths up to length 'maxlen' between specified groups of vertices. This function is needed only because igraph's 'all\_shortest\_paths' finds only the shortest, not any path up to a defined length.

### Usage

```
find_all_paths(  
  graph,  
  start,  
  end,  
  attr = NULL,  
  mode = 'OUT',  
  maxlen = 2,  
  progress = TRUE  
)
```

### Arguments

graph	An igraph graph object.
start	Integer or character vector with the indices or names of one or more start vertices.
end	Integer or character vector with the indices or names of one or more end vertices.
attr	Character: name of the vertex attribute to identify the vertices by. Necessary if 'start' and 'end' are not igraph vertex ids but for example vertex names or labels.
mode	Character: IN, OUT or ALL. Default is OUT.
maxlen	Integer: maximum length of paths in steps, i.e. if maxlen = 3, then the longest path may consist of 3 edges and 4 nodes.
progress	Logical: show a progress bar.

### Value

List of vertex paths, each path is a character or integer vector.

### See Also

- [interaction\\_graph](#)
- [enzsub\\_graph](#)
- [giant\\_component](#)

## Examples

```
interactions <- import_omnipath_interactions()
graph <- interaction_graph(interactions)
paths <- find_all_paths(
  graph = graph,
  start = c('EGFR', 'STAT3'),
  end = c('AKT1', 'ULK1'),
  attr = 'name'
)
```

---

get\_annotation\_resources

*Retrieves a list of available resources in the annotations database of OmniPath*

---

## Description

Get the names of the resources from <https://omnipath.org/annotations>.

## Usage

```
get_annotation_resources(dataset = NULL, ...)
```

## Arguments

dataset	ignored for this query type
...	optional additional arguments

## Value

character vector with the names of the annotation resources

## See Also

- [get\\_resources](#)
- [import\\_omnipath\\_annotations](#)

## Examples

```
get_annotation_resources()
```



---

get\_complex\_genes      *Get all the molecular complexes for a given gene(s)*

---

### Description

This function returns all the molecular complexes where an input set of genes participate. User can choose to retrieve every complex where any of the input genes participate or just retrieve these complexes where all the genes in input set participate together.

### Usage

```
get_complex_genes(  
  complexes = import_omnipath_complexes(),  
  select_genes,  
  total_match = FALSE  
)
```

### Arguments

complexes	complexes data frame (obtained using <a href="#">import_omnipath_complexes</a> )
select_genes	vector containing the genes for whom complexes will be retrieved (hgnc format).
total_match	[default=FALSE] logical indicating if the user wants to get all the complexes where any of the input genes participate (FALSE) or to get only the complexes where all the input genes participate together (TRUE).

### Value

Data frame of complexes

### See Also

[import\\_omnipath\\_complexes](#)

### Examples

```
complexes <- import_omnipath_complexes(  
  filter_databases = c("CORUM", "hu.MAP")  
)  
query_genes <- c("LMNA", "BANF1")  
complexes_query_genes <- get_complex_genes(complexes, query_genes)
```

---

`get_complex_resources` *Retrieve a list of complex resources available in Omnipath*

---

**Description**

Get the names of the resources from <https://omnipath.org/complexes>

**Usage**

```
get_complex_resources(dataset = NULL)
```

**Arguments**

`dataset` ignored for this query type

**Value**

character vector with the names of the databases

**See Also**

- [get\\_resources](#)
- [import\\_omnipath\\_complexes](#)

**Examples**

```
get_complex_resources()
```

---

`get_db` *Access a built in database*

---

**Description**

Databases are resources which might be costly to load but can be used many times by functions which usually automatically load and retrieve them from the database manager. Each database has a lifetime and will be unloaded automatically upon expiry.

**Usage**

```
get_db(key, param = NULL, reload = FALSE)
```

**Arguments**

key	Character: the key of the database to load. For a list of available keys see <a href="#">omnipath_show_db</a> .
param	List: override the defaults or pass further parameters to the database loader function. See the loader functions and their default parameters in <a href="#">omnipath_show_db</a> . If the database is already loaded with different parameters it will be reloaded with the new parameters only if the reload option is TRUE.
reload	Reload the database if param passed here is different from the parameters used the last time the database was loaded. If different functions with different parameters access the database repeatedly and request reload the frequent reloads might cost substantial time and resource use.

**Value**

An object with the database contents. The exact format depends on the database, most often it is a data frame or a list.

**See Also**

[omnipath\\_show\\_db](#).

**Examples**

```
goslim <- get_db('go_slim')
```

---

get\_enzsub\_resources *Retrieves a list of enzyme-substrate resources available in OmniPath*

---

**Description**

Get the names of the enzyme-substrate relationship resources available in <https://omnipath.org/enzsub>

**Usage**

```
get_enzsub_resources(dataset = NULL)
```

**Arguments**

dataset ignored for this query type

**Value**

character vector with the names of the enzyme-substrate resources

**See Also**

- [get\\_resources](#)
- [import\\_omnipath\\_enzsub](#)

**Examples**

```
get_enzsub_resources()
```

---

```
get_interaction_resources
```

*Retrieve a list of interaction resources available in Omnipath*

---

**Description**

Gets the names of the resources from <https://omnipath.org/interactions>.

**Usage**

```
get_interaction_resources(dataset = NULL)
```

**Arguments**

`dataset` a dataset within the interactions query type. Currently available datasets are 'omnipath', 'kinaseextra', 'pathwayextra', 'ligrecextra', 'dorothea', 'tf\_target', 'tf\_mirna', 'mirnatarget' and 'lncrna\_mrna'

**Value**

character vector with the names of the interaction databases

**See Also**

- [get\\_resources](#)
- [import\\_all\\_interactions](#)
- [import\\_omnipath\\_interactions](#)
- [import\\_pathwayextra\\_interactions](#)
- [import\\_kinaseextra\\_interactions](#)
- [import\\_ligrecextra\\_interactions](#)
- [import\\_mirnatarget\\_interactions](#)
- [import\\_dorothea\\_interactions](#)

**Examples**

```
get_interaction_resources()
```

---

`get_intercell_categories`*Categories in the intercell database of OmniPath*

---

**Description**

Retrieves a list of categories from <https://omnipath.org/intercell>.

**Usage**

```
get_intercell_categories()
```

**Value**

character vector with the different intercell categories

**See Also**

- [import\\_omnipath\\_intercell](#)
- [get\\_intercell\\_generic\\_categories](#)

**Examples**

```
get_intercell_categories()
```

---

`get_intercell_generic_categories`*Retrieves a list of the generic categories in the intercell database of  
OmniPath*

---

**Description**

Retrieves a list of the generic categories from <https://omnipath.org/intercell>.

**Usage**

```
get_intercell_generic_categories()
```

**Value**

character vector with the different intercell main classes

**See Also**

- [import\\_omnipath\\_intercell](#)
- [get\\_intercell\\_categories](#)

**Examples**

```
get_intercell_generic_categories()
```

---

```
get_intercell_resources
```

*Retrieves a list of intercellular communication resources available in OmniPath*

---

**Description**

Retrieves a list of the databases from <https://omnipath.org/intercell>.

**Usage**

```
get_intercell_resources(dataset = NULL)
```

**Arguments**

dataset            ignored at this query type

**Value**

character vector with the names of the databases

**See Also**

- [get\\_resources](#)
- [import\\_omnipath\\_intercell](#)

**Examples**

```
get_intercell_resources()
```

---

get_ontology_db	<i>Access an ontology database</i>
-----------------	------------------------------------

---

### Description

Retrieves an ontology database with relations in the desired data structure. The database is automatically loaded and the requested data structure is constructed if necessary. The databases stay loaded up to a certain time period (see the option `omnipath.db_lifetime`). Hence the first one of repeated calls to this function might take long and the subsequent ones should be really quick.

### Usage

```
get_ontology_db(key, rel_fmt = "tbl", child_parents = TRUE)
```

### Arguments

key	Character: key of the ontology database. For the available keys see <a href="#">omnipath_show_db</a> .
rel_fmt	Character: the data structure of the ontology relations. Possible values are 1) "tbl" a data frame, 2) "lst" a list or 3) "gra" a graph.
child_parents	Logical: whether the ontology relations should point from child to parents (TRUE) or from parent to children (FALSE).

### Value

A list with the following elements: 1) "names" a table with term IDs and names; 2) "namespaces" a table to connect term IDs and namespaces they belong to; 3) "relations" a table with relations between terms and their parent terms; 4) "subsets" a table with terms and the subsets they are part of; 5) "obsolete" character vector with all the terms labeled as obsolete.

### See Also

- [omnipath\\_show\\_db](#)
- [get\\_db](#)

### Examples

```
go <- get_ontology_db('go_basic', child_parents = FALSE)
```

---

get_resources	<i>Retrieve the available resources for a given query type</i>
---------------	--

---

**Description**

Collects the names of the resources available in OmniPath for a certain query type and optionally for a dataset within that.

**Usage**

```
get_resources(query_type, datasets = NULL, generic_categories = NULL)
```

**Arguments**

query_type	one of the query types 'interactions', 'enz_sub', 'complexes', 'annotations' or 'intercell'
datasets	currently within the 'interactions' query type only, multiple datasets are available: 'omnipath', 'kinaseextra', 'pathwayextra', 'ligreextra', 'dorothea', 'tf_target', 'tf_mirna', 'mirnarget' and 'lncrna_mrna'.
generic_categories	for the 'intercell' query type, restrict the search for some generic categories e.g. 'ligand' or 'receptor'.

**Value**

a character vector with resource names

**Examples**

```
get_resources(query_type = 'interactions')
```

---

get_signed_ptms	<i>Signs for enzyme-substrate interactions</i>
-----------------	--

---

**Description**

Enzyme-substrate data does not contain sign (activation/inhibition), we generate this information based on the interaction network.

**Usage**

```
get_signed_ptms(
  enzsub = import_omnipath_enzsub(),
  interactions = import_omnipath_interactions()
)
```



**Arguments**

enzsub            Enzyme-substrate data frame generated by [import\\_omnipath\\_enzsub](#)  
interactions    interaction data frame generated by [import\\_omnipath\\_interactions](#)

**Value**

Data frame of enzyme-substrate relationships with is\_inhibition and is\_stimulation columns.

**See Also**

- [import\\_omnipath\\_enzsub](#)
- [import\\_omnipath\\_interactions](#)

**Examples**

```
enzsub <- import_omnipath_enzsub(resources = c('PhosphoSite', 'SIGNOR'))  
interactions <- import_omnipath_interactions()  
enzsub <- get_signed_ptms(enzsub, interactions)
```

---

giant_component	<i>Giant component of a graph</i>
-----------------	-----------------------------------

---

**Description**

For an igraph graph object returns its giant component.

**Usage**

```
giant_component(graph)
```

**Arguments**

graph            An igraph graph object.

**Value**

An igraph graph object containing only the giant component.

**Examples**

```
interactions <- import_post_translational_interactions()  
graph <- interaction_graph(interactions)  
graph_gc <- giant_component(graph)
```

---

go\_annot\_download      *Gene annotations from Gene Ontology*

---

### Description

Gene Ontology is an ontology of gene subcellular localizations, molecular functions and involvement in biological processes. Gene products across many organisms are annotated with the ontology terms. This function downloads the gene-ontology term associations for certain model organisms or all organisms. For a description of the columns see <http://geneontology.org/docs/go-annotation-file-gaf-format-2.2/>.

### Usage

```
go_annot_download(organism = "human", aspects = c("C", "F", "P"), slim = NULL)
```

### Arguments

organism	Character: either "chicken", "cow", "dog", "human", "pig" or "uniprot_all".
aspects	Character vector with some of the following elements: "C" (cellular component), "F" (molecular function) and "P" (biological process). Gene Ontology is three separate ontologies called as three aspects. By this parameter you can control which aspects to include in the output.
slim	Character: if not NULL, the name of a GOsubset (slim). instead of the full GO annotation, the slim annotation will be returned. See details at <a href="#">go_annot_slim</a> . If TRUE, the "generic" slim will be used.

### Value

A tibble (data frame) of annotations as it is provided by the database

### Examples

```
goa_data <- go_annot_download()
goa_data
# # A tibble: 606,840 x 17
#   db      db_object_id db_object_symbol qualifier go_id  db_ref
#   <fct>   <chr>          <chr>          <fct>   <chr> <chr>
# 1 UniProt. A0A024RBG1  NUDT4B          NA       GO:000. GO_REF:00.
# 2 UniProt. A0A024RBG1  NUDT4B          NA       GO:000. GO_REF:00.
# 3 UniProt. A0A024RBG1  NUDT4B          NA       GO:004. GO_REF:00.
# 4 UniProt. A0A024RBG1  NUDT4B          NA       GO:005. GO_REF:00.
# 5 UniProt. A0A024RBG1  NUDT4B          NA       GO:005. GO_REF:00.
# # . with 606,830 more rows, and 11 more variables:
# #   evidence_code <fct>, with_or_from <chr>, aspect <fct>,
# #   db_object_name <chr>, db_object_synonym <chr>,
# #   db_object_type <fct>, taxon <fct>, date <date>,
# #   assigned_by <fct>, annotation_extension <chr>,
# #   gene_product_from_id <chr>
```

---

 go\_annot\_slim

*GO slim gene annotations*


---

## Description

GO slims are subsets of the full GO which "give a broad overview of the ontology content without the detail of the specific fine grained terms". In order to annotate genes with GO slim terms, we take the annotations and search all ancestors of the terms up to the root of the ontology tree. From the ancestors we select the terms which are part of the slim subset.

## Usage

```
go_annot_slim(
  organism = "human",
  slim = "generic",
  aspects = c("C", "F", "P"),
  cache = TRUE
)
```

## Arguments

organism	Character: either "chicken", "cow", "dog", "human", "pig" or "uniprot_all".
slim	Character: the GO subset (GO slim) name. Available GO slims are: "agr" (Alliance for Genomics Resources), "generic", "aspergillus", "candida", "drosophila", "chembl", "metagenomic", "mouse", "plant", "pir" (Protein Information Resource), "pombe" and "yeast".
aspects	Character vector with some of the following elements: "C" (cellular component), "F" (molecular function) and "P" (biological process). Gene Ontology is three separate ontologies called as three aspects. By this parameter you can control which aspects to include in the output.
cache	Logical: Load the result from cache if available.

## Details

Building the GO slim is resource intensive in its current implementation. For human annotation and generic GO slim it might take around 20 minutes. The result is saved into the cache so next time loading the data from there is really quick. If the cache option is FALSE the data will be built fresh (the annotation and ontology files still might come from cache), and the newly build GO slim will overwrite the cache instance.

## Value

A tibble (data frame) of genes annotated with ontology terms in in the GO slim (subset).

**See Also**

- [go\\_annot\\_download](#)
- [go\\_ontology\\_download](#)
- [get\\_db](#)

**Examples**

```
goslim <- go_annot_slim(organism = 'human', slim = 'generic')
goslim
# # A tibble: 276,371 x 8
#   db      db_object_id db_object_symbol go_id aspect db_object_name
#   <fct> <chr>          <chr>          <chr> <fct> <chr>
# 1 UniPr. A0A024RBG1  NUDT4B          GO:0. F      Diphosphoinosito.
# 2 UniPr. A0A024RBG1  NUDT4B          GO:0. F      Diphosphoinosito.
# 3 UniPr. A0A024RBG1  NUDT4B          GO:0. C      Diphosphoinosito.
# 4 UniPr. A0A024RBG1  NUDT4B          GO:0. C      Diphosphoinosito.
# 5 UniPr. A0A024RBG1  NUDT4B          GO:0. C      Diphosphoinosito.
# # . with 276,366 more rows, and 2 more variables:
# #   db_object_synonym <chr>, db_object_type <fct>
```

---

go\_ontology\_download *The Gene Ontology tree*

---

**Description**

The Gene Ontology tree

**Usage**

```
go_ontology_download(
  basic = TRUE,
  tables = TRUE,
  subset = NULL,
  relations = c("is_a", "part_of", "occurs_in", "regulates", "positively_regulates",
    "negatively_regulates")
)
```

**Arguments**

**basic** Logical: use the basic or the full version of GO. As written on the GO home page: "the basic version of the GO is filtered such that the graph is guaranteed to be acyclic and annotations can be propagated up the graph. The relations included are is a, part of, regulates, negatively regulates and positively regulates. This version excludes relationships that cross the 3 GO hierarchies. This version should be used with most GO-based annotation tools."

tables	In the result return data frames or nested lists. These later can be converted to each other if necessary. However converting from table to list is faster.
subset	Character: the GO subset (GO slim) name. GO slims are subsets of the full GO which "give a broad overview of the ontology content without the detail of the specific fine grained terms". This option, if not NULL, overrides the basic parameter. Available GO slims are: "agr" (Alliance for Genomics Resources), "generic", "aspergillus", "candida", "drosophila", "chembl", "metagenomic", "mouse", "plant", "pir" (Protein Information Resource), "pombe" and "yeast".
relations	Character vector: the relations to include in the processed data.

### Value

A list with the following elements: 1) "names" a list with terms as names and names as values; 2) "namespaces" a list with terms as names and namespaces as values; 3) "relations" a list with relations between terms: terms are keys, values are lists with relations as names and character vectors of related terms as values; 4) "subsets" a list with terms as keys and character vectors of subset names as values (or NULL if the term does not belong to any subset); 5) "obsolete" character vector with all the terms labeled as obsolete. If the tables parameter is TRUE, "names", "namespaces", "relations" and "subsets" will be data frames (tibbles).

### Examples

```
# retrieve the generic GO slim, a small subset of the full ontology
go <- go_ontology_download(subset = 'generic')
```

---

guide2pharma\_download *Downloads interactions from the Guide to Pharmacology database*

---

### Description

Downloads ligand-receptor interactions from the Guide to Pharmacology (IUPHAR/BPS) database (<https://www.guidetopharmacology.org/>).

### Usage

```
guide2pharma_download()
```

### Value

A tibble (data frame) of interactions as it is provided by the database

**Examples**

```
g2p_data <- guide2pharma_download()
g2p_data
# # A tibble: 21,586 x 38
#   target target_id target_gene_sym. target_uniprot target_ensembl_
#   <chr>      <dbl> <chr>                <chr>          <chr>
# 1 12S-L.      1387 ALOX12             P18054         ENSG00000108839
# 2 15-LO.      1388 ALOX15             P16050         ENSG00000161905
# 3 15-LO.      1388 ALOX15             P16050         ENSG00000161905
# 4 15-LO.      1388 ALOX15             P16050         ENSG00000161905
# # . with 21,576 more rows, and 33 more variables: target_ligand <chr>,
# #   target_ligand_id <chr>, target_ligand_gene_symbol <chr>,
# #   ... (truncated)
```

---

harmonizome\_download *Downloads a Harmonizome network dataset*

---

**Description**

Downloads a single network dataset from Harmonizome <https://maayanlab.cloud/Harmonizome>.

**Usage**

```
harmonizome_download(dataset)
```

**Arguments**

dataset            The dataset part of the URL. Please refer to the download section of the Harmonizome webpage.

**Value**

Data frame (tibble) with interactions.

**Examples**

```
harmonizome_data <- harmonizome_download('phosphositeplus')
harmonizome_data
# # A tibble: 6,013 x 7
#   source source_desc source_id target target_desc target_id weight
#   <chr>   <chr>          <dbl> <chr> <chr>          <dbl> <dbl>
# 1 TP53    na              7157 STK17A na              9263    1
# 2 TP53    na              7157 TP53RK na              112858  1
# 3 TP53    na              7157 SMG1  na              23049   1
# 4 UPF1    na              5976 SMG1  na              23049   1
# # . with 6,003 more rows
```

---

hpo\_download                      *Downloads protein annotations from Human Phenotype Ontology*

---

### Description

Human Phenotype Ontology (HPO) provides a standardized vocabulary of phenotypic abnormalities encountered in human disease. Each term in the HPO describes a phenotypic abnormality. HPO currently contains over 13,000 terms and over 156,000 annotations to hereditary diseases. See more at <https://hpo.jax.org/app/>.

### Usage

```
hpo_download()
```

### Value

A tibble (data frame) of annotations as it is provided by the database

### Examples

```
hpo_data <- hpo_download()
hpo_data
# # A tibble: 231,738 x 9
#   entrez_gene_id entrez_gene_symb. hpo_term_id hpo_term_name
#   <dbl> <chr> <chr> <chr>
# 1     8192 CLPP      HP:0000013 Hypoplasia of the ute.
# 2     8192 CLPP      HP:0004322 Short stature
# 3     8192 CLPP      HP:0000786 Primary amenorrhea
# 4     8192 CLPP      HP:0000007 Autosomal recessive i.
# 5     8192 CLPP      HP:0000815 Hypergonadotropic hyp.
# # . with 231,733 more rows, and 5 more variables:
# #   frequency_raw <chr>, frequency_hpo <chr>, info_gd_source <chr>,
# #   gd_source <chr>, disease_id <chr>
```

---

htridb\_download                      *Downloads TF-target interactions from HTRIdb*

---

### Description

HTRIdb (<https://www.lbbc.ibb.unesp.br/htri/>) is a database of literature curated human TF-target interactions. As the database is recently offline, the data is distributed by the OmniPath rescued data repository (<https://rescued.omnipathdb.org/>).

### Usage

```
htridb_download()
```

**Value**

Data frame (tibble) with interactions.

**Examples**

```
htridb_data <- htridb_download()
htridb_data
# # A tibble: 18,630 x 7
#   OID GENEID_TF SYMBOL_TF GENEID_TG SYMBOL_TG TECHNIQUE
#   <dbl> <dbl> <chr> <dbl> <chr> <chr>
# 1 32399 142 PARP1 675 BRCA2 Electrophoretic Mobi.
# 2 32399 142 PARP1 675 BRCA2 Chromatin Immunoprec.
# 3 28907 196 AHR 1543 CYP1A1 Chromatin Immunoprec.
# 4 29466 196 AHR 1543 CYP1A1 Electrophoretic Mobi.
# 5 28911 196 AHR 1543 CYP1A1 Chromatin Immunoprec.
# # . with 18,620 more rows, and 1 more variable: PUBMED_ID <chr>
```

---

```
import_all_interactions
```

*Imports all interaction datasets available in OmniPath*

---

**Description**

The interaction datasets currently available in OmniPath:

**Usage**

```
import_all_interactions(
  resources = NULL,
  organism = 9606,
  dorothea_levels = c("A", "B"),
  exclude = NULL,
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  ...
)

import_AllInteractions(...)
```

**Arguments**

**resources** interactions not reported in these databases are removed. See [get\\_interaction\\_resources](#) for more information.

**organism** Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse



dorothea_levels	The confidence levels of the dorothea interactions (TF-target) which range from A to D. Set to A and B by default.
exclude	Character: datasets or resources to exclude.
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
...	Passed to import_all_interactions.

### Details

omnipath: the OmniPath data as defined in the paper, an arbitrary optimum between coverage and quality  
pathwayextra: activity flow interactions without literature reference  
kinaseextra: enzyme-substrate interactions without literature reference  
ligreextra: ligand-receptor interactions without literature reference  
dorothea: transcription factor (TF)-target interactions from DoRoThEA  
tf\_target: transcription factor (TF)-target interactions from other resources  
mirnatarget: miRNA-mRNA interactions  
tf\_mirna: TF-miRNA interactions  
lncrna\_mrna: lncRNA-mRNA interactions

### Value

A dataframe containing all the datasets in the interactions query

### See Also

- [get\\_interaction\\_resources](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

### Examples

```
interactions <- import_all_interactions(  
  resources = c('HPRD', 'BioGRID'),  
  organism = 9606  
)
```

---

```
import_dorothea_interactions
```

*From the OmniPath webservice imports interactions from the DoRothEA dataset*

---

## Description

Imports the dataset from: <https://omnipathdb.org/interactions?datasets=dorothea> which contains transcription factor (TF)-target interactions from DoRothEA <https://github.com/saezlab/DoRothEA>

## Usage

```
import_dorothea_interactions(
  resources = NULL,
  organism = 9606,
  dorothea_levels = c("A", "B"),
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  exclude = NULL,
  ...
)
```

## Arguments

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
dorothea_levels	Vector detailing the confidence levels of the interactions to be downloaded. In dorothea, every TF-target interaction has a confidence score ranging from A to E, being A the most reliable interactions. By default we take A and B level interactions (c(A,B)). It is to note that E interactions are not available in OmnipathR.
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	optional additional arguments

**Value**

A dataframe containing TF-target interactions from DoRothEA

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
interactions <- import_dorothea_interactions(  
  resources = c('DoRothEA', 'ARACNe-GTEx_DoRothEA'),  
  organism = 9606,  
  dorothea_levels = c('A', 'B', 'C')  
)
```

---

import\_intercell\_network

*Intercellular communication network*

---

**Description**

Imports an intercellular network by combining intercellular annotations and protein interactions. First imports a network of protein-protein interactions. Then, it retrieves annotations about the proteins intercellular communication roles, once for the transmitter (delivering information from the expressing cell) and second, the receiver (receiving signal and relaying it towards the expressing cell) side. These 3 queries can be customized by providing parameters in lists which will be passed to the respective methods ([import\\_omnipath\\_interactions](#) for the network and [import\\_omnipath\\_intercell](#) for the annotations). Finally the 3 data frames combined in a way that the source proteins in each interaction annotated by the transmitter, and the target proteins by the receiver categories. If undirected interactions present (these are disabled by default) they will be duplicated, i.e. both partners can be both receiver and transmitter.

**Usage**

```
import_intercell_network(  
  interactions_param = list(),  
  transmitter_param = list(),  
  receiver_param = list(),  
  resources = NULL,  
  entity_types = NULL,  
  ligand_receptor = FALSE,  
  high_confidence = FALSE,
```

```

simplify = FALSE,
unique_pairs = FALSE,
consensus_percentile = NULL,
loc_consensus_percentile = NULL,
omnipath = TRUE,
ligreextra = TRUE,
kinaseextra = !high_confidence,
pathwayextra = !high_confidence,
...
)

```

## Arguments

**interactions\_param** a list with arguments for an interactions query: `import_omnipath_interactions`, `import_pathwayextra_interactions`, `import_kinaseextra_interactions`, `import_ligreextra_interactions`

**transmitter\_param** a list with arguments for `import_omnipath_intercell`, to define the transmitter side of intercellular connections

**receiver\_param** a list with arguments for `import_omnipath_intercell`, to define the receiver side of intercellular connections

**resources** A character vector of resources to be applied to both the interactions and the annotations. For example, `resources = 'CellChatDB'` will download the transmitters and receivers defined by CellChatDB, connected by connections from CellChatDB.

**entity\_types** Character, possible values are "protein", "complex" or both.

**ligand\_receptor** Logical. If TRUE, only *ligand* and *receptor* annotations will be used instead of the more generic *transmitter* and *receiver* categories.

**high\_confidence** Logical: shortcut to do some filtering in order to include only higher confidence interactions. The intercell database of OmniPath covers a very broad range of possible ways of cell to cell communication, and the pieces of information, such as localization, topology, function and interaction, are combined from many, often independent sources. This unavoidably result some weird and unexpected combinations which are false positives in the context of intercellular communication. This option sets some minimum criteria to remove most (but definitely not all!) of the wrong connections. These criteria are the followings: 1) the receiver must be plasma membrane transmembrane; 2) the curation effort for interactions must be larger than one; 3) the consensus score for annotations must be larger than the 50 percentile within the generic category (you can override this by `consensus_percentile`). 4) the transmitter must be secreted or exposed on the plasma membrane. 5) The major localizations have to be supported by at least 30 percent of the relevant resources ( you can override this by `loc_consensus_percentile`). 6) The datasets with lower level of curation (*kinaseextra* and *pathwayextra*) will be disabled. These criteria are of medium

	stringency, you can always tune them to be more relaxed or stringent by filtering manually, using <a href="#">filter_intercell_network</a> .
simplify	Logical: keep only the most often used columns. This function combines a network data frame with two copies of the intercell annotation data frames, all of them already having quite some columns. With this option we keep only the names of the interacting pair, their intercellular communication roles, and the minimal information of the origin of both the interaction and the annotations.
unique_pairs	Logical: instead of having separate rows for each pair of annotations, drop the annotations and reduce the data frame to unique interacting pairs. See <a href="#">unique_intercell_network</a> for details.
consensus_percentile	Numeric: a percentile cut off for the consensus score of generic categories in intercell annotations. The consensus score is the number of resources supporting the classification of an entity into a category based on combined information of many resources. Here you can apply a cut-off, keeping only the annotations supported by a higher number of resources than a certain percentile of each category. If NULL no filtering will be performed. The value is either in the 0-1 range, or will be divided by 100 if greater than 1. The percentiles will be calculated against the generic composite categories and then will be applied to their resource specific annotations and specific child categories.
loc_consensus_percentile	Numeric: similar to consensus_percentile for major localizations. For example, with a value of 50, the secreted, plasma membrane transmembrane or peripheral attributes will be TRUE only where at least 50 percent of the resources support these.
omnipath	Logical: shortcut to include the <i>omnipath</i> dataset in the interactions query.
ligreextra	Logical: shortcut to include the <i>ligreextra</i> dataset in the interactions query.
kinaseextra	Logical: shortcut to include the <i>kinaseextra</i> dataset in the interactions query.
pathwayextra	Logical: shortcut to include the <i>pathwayextra</i> dataset in the interactions query.
...	If simplify or unique_pairs is TRUE, additional column names can be passed here to <code>dplyr::select</code> on the final data frame. Otherwise ignored.

## Details

By default this function creates almost the largest possible network of intercellular interactions. However, this might contain a large number of false positives. Please refer to the documentation of the arguments, especially `high_confidence`, and the [filter\\_intercell\\_network](#) function. Note: if you restrict the query to certain intercell annotation resources or small categories, it's not recommended to use the `consensus_percentile` or `high_confidence` options, instead filter the network with [filter\\_intercell\\_network](#) for more consistent results.

## Value

A dataframe containing information about protein-protein interactions and the inter-cellular roles of the proteins involved in those interactions.

**See Also**

- [get\\_intercell\\_categories](#)
- [get\\_intercell\\_generic\\_categories](#)
- [import\\_omnipath\\_intercell](#)
- [import\\_omnipath\\_interactions](#)
- [import\\_pathwayextra\\_interactions](#)
- [import\\_kinaseextra\\_interactions](#)
- [import\\_ligrecextra\\_interactions](#)
- [unique\\_intercell\\_network](#)
- [simplify\\_intercell\\_network](#)
- [filter\\_intercell\\_network](#)

**Examples**

```
intercell_network <- import_intercell_network(  
  interactions_param = list(datasets = 'ligrecextra'),  
  receiver_param = list(categories = c('receptor', 'transporter')),  
  transmitter_param = list(categories = c('ligand', 'secreted_enzyme'))  
)
```

---

```
import_kinaseextra_interactions
```

*Imports interactions from the 'kinase extra' dataset of OmniPath*

---

**Description**

Imports the dataset from: <https://omnipathdb.org/interactions?datasets=kinaseextra>, which contains enzyme-substrate interactions without literature reference. The enzyme-substrate interactions supported by literature references are part of the 'omnipath' dataset.

**Usage**

```
import_kinaseextra_interactions(  
  resources = NULL,  
  organism = 9606,  
  fields = NULL,  
  default_fields = TRUE,  
  references_by_resource = TRUE,  
  exclude = NULL,  
  ...  
)
```

**Arguments**

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	Optional additional arguments.

**Value**

A dataframe containing enzyme-substrate interactions without literature reference

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
interactions <-
  import_kinaseextra_interactions(
    resources = c('PhosphoPoint', 'PhosphoSite'),
    organism = 9606
  )
```

---

```
import_ligrecextra_interactions
```

*Imports interactions from the 'ligrec extra' dataset of OmniPath*

---

**Description**

Imports the dataset from: <https://omnipathdb.org/interactions?datasets=ligrecextra>, which contains ligand-receptor interactions without literature reference. The ligand-receptor interactions supported by literature references are part of the 'omnipath' dataset.

**Usage**

```
import_ligrecextra_interactions(
  resources = NULL,
  organism = 9606,
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  exclude = NULL,
  ...
)
```

**Arguments**

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	optional additional arguments

**Value**

A dataframe containing ligand-receptor interactions including the ones without literature references

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
interactions <- import_ligrecextra_interactions(
  resources = c('HPRD', 'Guide2Pharma'),
  organism = 9606
)
```



---

```
import_lncrna_mrna_interactions
```

*Imports interactions from the lncRNA-mRNA dataset of OmniPath*

---

## Description

Imports the dataset from: [https://omnipathdb.org/interactions?datasets=lncrna\\_mrna](https://omnipathdb.org/interactions?datasets=lncrna_mrna), which contains lncRNA-mRNA interactions

## Usage

```
import_lncrna_mrna_interactions(  
    resources = NULL,  
    organism = 9606,  
    fields = NULL,  
    default_fields = TRUE,  
    references_by_resource = TRUE,  
    exclude = NULL,  
    ...  
)
```

## Arguments

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	optional additional arguments

## Value

A dataframe containing lncRNA-mRNA interactions

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
interactions <-  
  import_lncrna_mrna_interactions(  
    resources = c('ncRDeathDB')  
  )
```

---

```
import_mirnatarget_interactions
```

*Imports interactions from the miRNA-target dataset of OmniPath*

---

**Description**

Imports the dataset from: <https://omnipathdb.org/interactions?datasets=mirnatarget>, which contains miRNA-mRNA interactions.

**Usage**

```
import_mirnatarget_interactions(  
  resources = NULL,  
  organism = 9606,  
  fields = NULL,  
  default_fields = TRUE,  
  references_by_resource = TRUE,  
  exclude = NULL,  
  ...  
)
```

**Arguments**

- |                |   |
|----------------|---|
| resources      | interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.                             |
| organism       | Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse  |
| fields         | The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.  |
| default_fields | whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added. |

```
references_by_resource
    if FALSE, removes the resource name prefixes from the references (PubMed
    IDs); this way the information which reference comes from which resource will
    be lost and the PubMed IDs will be unique.
exclude      Character: datasets or resources to exclude.
...         optional additional arguments
```

### Value

A dataframe containing miRNA-mRNA interactions

### See Also

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

### Examples

```
interactions <-
  import_mirnatarget_interactions(
    resources = c('miRTarBase', 'miRecords')
  )
```

---

```
import_omnipath_annotations
```

*Imports annotations from OmniPath*

---

### Description

Imports protein annotations about function, localization, expression, structure and other properties of proteins from OmniPath <https://omnipathdb.org/annotations>. Note: there might be also a few miRNAs annotated; a vast majority of protein complex annotations are inferred from the annotations of the members: if all members carry the same annotation the complex inherits.

### Usage

```
import_omnipath_annotations(
  proteins = NULL,
  resources = NULL,
  wide = FALSE,
  ...
)
```

### Arguments

proteins	Vector containing the genes or proteins for whom annotations will be retrieved (UniProt IDs or HGNC Gene Symbols or miRBase IDs). It is also possible to download annotations for protein complexes. To do so, write 'COMPLEX:' right before the genesymbols of the genes integrating the complex. Check the vignette for examples.
resources	Load the annotations only from these databases. See <a href="#">get_annotation_resources</a> for possible values.
wide	Convert the annotation table to wide format, which corresponds more or less to the original resource. If the data comes from more than one resource a list of wide tables will be returned. See examples at <a href="#">pivot_annotations</a> .
...	Additional arguments.

### Details

Downloading the full annotations dataset is disabled by default because the size of this data is around 1GB. We recommend to retrieve the annotations for a set of proteins or only from a few resources, depending on your interest. You can always download the full database from [https://archive.omnipathdb.org/omnipath\\_webservice\\_annotations\\_\\_recent.tsv](https://archive.omnipathdb.org/omnipath_webservice_annotations__recent.tsv) using any standard R or readr method.

### Value

A data frame containing different gene and complex annotations.

### See Also

- [get\\_annotation\\_databases](#)
- [pivot\\_annotations](#)

### Examples

```
annotations <- import_omnipath_annotations(  
  proteins = c('TP53', 'LMNA'),  
  resources = c('HPA_subcellular')  
)
```

---

```
import_omnipath_complexes
```

*Imports protein complexes from OmniPath*

---

### Description

Imports the complexes stored in Omnipath database from <https://omnipathdb.org/complexes>.

**Usage**

```
import_omnipath_complexes(resources = NULL, ...)
```

**Arguments**

resources	complexes not reported in these databases are removed. See <a href="#">get_complexes_databases</a> for more information.
...	optional additional arguments

**Value**

A dataframe containing information about complexes

**See Also**

- [get\\_complexes\\_databases](#)

**Examples**

```
complexes = import_omnipath_complexes(  
  resources = c('CORUM', 'hu.MAP')  
)
```

---

```
import_omnipath_enzsub
```

*Imports enzyme-substrate relationships from OmniPath*

---

**Description**

Imports the enzyme-substrate (more exactly, enzyme-PTM) relationship database from <https://omnipathdb.org/enzsub>

**Usage**

```
import_omnipath_enzsub(  
  resources = NULL,  
  organism = 9606,  
  fields = NULL,  
  default_fields = TRUE,  
  references_by_resource = TRUE,  
  exclude = NULL,  
  ...  
)
```

**Arguments**

resources	PTMs not reported in these databases are removed. See <a href="#">get_ptms_databases</a> for more information.
organism	PTMs are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
fields	You can define here additional fields to be added to the result. If used, set the next argument, default_fields, to FALSE.
default_fields	Whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the fields argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	Optional additional arguments.

**Value**

A data frame containing the information about ptms

**See Also**

- [get\\_enzsub\\_resources](#)
- [import\\_omnipath\\_interactions](#)
- [enzsub\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
enzsub <- import_omnipath_enzsub(
  resources = c('PhosphoSite', 'SIGNOR'),
  organism = 9606
)
```

---

```
import_omnipath_interactions
```

*Imports interactions from the 'omnipath' dataset of Omnipath*

---

**Description**

Imports the database from <https://omnipathdb.org/interactions>, which contains only interactions supported by literature references. This part of the interaction database compiled a similar way as it has been presented in the first paper describing OmniPath (Turei et al. 2016).

**Usage**

```
import_omnipath_interactions(
  resources = NULL,
  organism = 9606,
  datasets = "omnipath",
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  exclude = NULL,
  ...
)
```

**Arguments**

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
datasets	Names of the interaction datasets to download: omnipath (by default). Other possibilities are: pathwayextra, kinaseextra, ligreextra, dorothea,tf_target, mirnatarget, tf_mirna, lncrna_mrna. The user can select multiple datasets as for example: c('omnipath', 'pathwayextra', 'kinaseextra')
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	optional additional arguments

**Value**

A dataframe of protein-protein interactions

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

## Examples

```
interactions = import_omnipath_interactions(  
    resources = c('SignalLink3'),  
    organism = 9606  
)
```

---

```
import_omnipath_intercell  
    Imports OmniPath intercell annotations
```

---

## Description

Imports the OmniPath intercellular communication role annotation database from <https://omnipathdb.org/intercell>. It provides information on the roles in inter-cellular signaling. E.g. if a protein is a ligand, a receptor, an extracellular matrix (ECM) component, etc.

## Usage

```
import_omnipath_intercell(  
    categories = NULL,  
    resources = NULL,  
    parent = NULL,  
    scope = NULL,  
    aspect = NULL,  
    source = NULL,  
    transmitter = NULL,  
    receiver = NULL,  
    secreted = NULL,  
    plasma_membrane_peripheral = NULL,  
    plasma_membrane_transmembrane = NULL,  
    proteins = NULL,  
    topology = NULL,  
    causality = NULL,  
    consensus_percentile = NULL,  
    loc_consensus_percentile = NULL,  
    ...  
)
```

## Arguments

categories	vector containing the categories to be retrieved. All the genes belonging to those categories will be returned. For further information about the categories see <a href="#">code</a> <a href="#">get_intercell_categories</a> .
resources	limit the query to certain resources; see the available resources by <a href="#">get_intercell_resources</a> .



parent	vector containing the parent classes to be retrieved. All the genes belonging to those classes will be returned. For further information about the main classes see <a href="#">get_intercell_categories</a> .
scope	either 'specific' or 'generic'
aspect	either 'locational' or 'functional'
source	either 'resource_specific' or 'composite'
transmitter	logical, include only transmitters i.e. proteins delivering signal from a cell to its environment.
receiver	logical, include only receivers i.e. proteins delivering signal to the cell from its environment.
secreted	logical, include only secreted proteins
plasma_membrane_peripheral	logical, include only plasma membrane peripheral membrane proteins.
plasma_membrane_transmembrane	logical, include only plasma membrane transmembrane proteins.
proteins	limit the query to certain proteins
topology	topology categories: one or more of 'secreted' (sec), 'plasma_membrane_peripheral' (pmp), 'plasma_membrane_transmembrane' (pmtm) (both short or long notation can be used).
causality	'transmitter' (trans), 'receiver' (rec) or 'both' (both short or long notation can be used).
consensus_percentile	Numeric: a percentile cut off for the consensus score of generic categories. The consensus score is the number of resources supporting the classification of an entity into a category based on combined information of many resources. Here you can apply a cut-off, keeping only the annotations supported by a higher number of resources than a certain percentile of each category. If NULL no filtering will be performed. The value is either in the 0-1 range, or will be divided by 100 if greater than 1. The percentiles will be calculated against the generic composite categories and then will be applied to their resource specific annotations and specific child categories.
loc_consensus_percentile	Numeric: similar to codeconsensus_percentile for major localizations. For example, with a value of 50, the secreted, plasma membrane transmembrane or peripheral attributes will be true only where at least 50 percent of the resources support these.
...	Additional optional arguments, ignored.

**Value**

A dataframe containing information about roles in intercellular signaling.

**See Also**

- [get\\_intercell\\_categories](#)
- [get\\_intercell\\_generic\\_categories](#)
- [import\\_intercell\\_network](#)
- [intercell\\_consensus\\_filter](#)

**Examples**

```
intercell <- import_omnipath_intercell(categories = 'ecm')
```

---

```
import_pathwayextra_interactions
```

*Imports interactions from the 'pathway extra' dataset of Omnipath*

---

**Description**

Imports the dataset from: <https://omnipathdb.org/interactions?datasets=pathwayextra>, which contains activity flow interactions without literature reference. The activity flow interactions supported by literature references are part of the 'omnipath' dataset.

**Usage**

```
import_pathwayextra_interactions(
  resources = NULL,
  organism = 9606,
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  exclude = NULL,
  ...
)
```

**Arguments**

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose one of those: 9606 human (default), 10116 rat or 10090 Mouse.
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.

```

references_by_resource
    if FALSE, removes the resource name prefixes from the references (PubMed
    IDs); this way the information which reference comes from which resource will
    be lost and the PubMed IDs will be unique.
exclude
    Character: datasets or resources to exclude.
...
    optional additional arguments

```

**Value**

A dataframe containing activity flow interactions between proteins without literature reference

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```

interactions <-
  import_pathwayextra_interactions(
    resources = c('BioGRID', 'IntAct'),
    organism = 9606
  )

```

---

```
import_post_translational_interactions
```

*All post-translational interactions from OmniPath*

---

**Description**

Imports interactions from all post-translational datasets of OmniPath. The datasets are "omnipath", "kinaseextra", "pathwayextra" and "ligreextra".

**Usage**

```

import_post_translational_interactions(
  resources = NULL,
  organism = 9606,
  exclude = NULL,
  references_by_resource = TRUE,
  ...
)

```

### Arguments

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
exclude	Character: datasets or resources to exclude.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
...	optional additional arguments

### Value

A dataframe containing post-translational interactions

### See Also

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

### Examples

```
interactions <-  
  import_post_translational_interactions(  
    resources = c('BioGRID')  
  )
```

---

```
import_tf_mirna_interactions
```

*Imports interactions from the TF-miRNA dataset of OmniPath*

---

### Description

Imports the dataset from: [https://omnipathdb.org/interactions?datasets=tf\\_mirna](https://omnipathdb.org/interactions?datasets=tf_mirna), which contains transcription factor-miRNA gene interactions

**Usage**

```
import_tf_mirna_interactions(
  resources = NULL,
  organism = 9606,
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  exclude = NULL,
  ...
)
```

**Arguments**

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
fields	The user can define here the fields to be added. If used, set the next argument, 'default_fields', to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the 'fields' argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	optional additional arguments

**Value**

A dataframe containing TF-miRNA interactions

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
interactions <-
  import_tf_mirna_interactions(
    resources = c('TransmiR')
  )
```

---

```
import_tf_target_interactions
```

*Imports interactions from the TF-target dataset of OmniPath*

---

## Description

Imports the dataset from: [https://omnipathdb.org/interactions?datasets=tf\\_target](https://omnipathdb.org/interactions?datasets=tf_target), which contains transcription factor-target protein coding gene interactions. Note: this is not the only TF-target dataset in OmniPath, ‘dorothea’ is the other one and the ‘tf\_mirna’ dataset provides TF-miRNA gene interactions.

## Usage

```
import_tf_target_interactions(
  resources = NULL,
  organism = 9606,
  fields = NULL,
  default_fields = TRUE,
  references_by_resource = TRUE,
  exclude = NULL,
  ...
)
```

## Arguments

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
fields	The user can define here the fields to be added. If used, set the next argument, ‘default_fields’, to FALSE.
default_fields	whether to include the default fields (columns) for the query type. If FALSE, only the fields defined by the user in the ‘fields’ argument will be added.
references_by_resource	if FALSE, removes the resource name prefixes from the references (PubMed IDs); this way the information which reference comes from which resource will be lost and the PubMed IDs will be unique.
exclude	Character: datasets or resources to exclude.
...	Optional additional arguments

## Value

A dataframe containing TF-target interactions

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```
interactions <-  
  import_tf_target_interactions(  
    resources = c('DoRothEA', 'SIGNOR')  
  )
```

---

```
import_transcriptional_interactions
```

*Imports all TF-target interactions from OmniPath*

---

**Description**

Imports the dataset from: [https://omnipathdb.org/interactions?datasets=tf\\_target,dorothea](https://omnipathdb.org/interactions?datasets=tf_target,dorothea), which contains transcription factor-target protein coding gene interactions.

**Usage**

```
import_transcriptional_interactions(  
  resources = NULL,  
  organism = 9606,  
  dorothea_levels = c("A", "B"),  
  references_by_resource = TRUE,  
  exclude = NULL,  
  ...  
)
```

**Arguments**

resources	interactions not reported in these databases are removed. See <a href="#">get_interaction_resources</a> for more information.
organism	Interactions are available for human, mouse and rat. Choose among: 9606 human (default), 10116 rat and 10090 Mouse
dorothea_levels	Vector detailing the confidence levels of the interactions to be downloaded. In dorothea, every TF-target interaction has a confidence score ranging from A to E, being A the most reliable interactions. By default we take A and B level interactions (c(A,B)). It is to note that E interactions are not available in OmnipathR.

```

references_by_resource
    if FALSE, removes the resource name prefixes from the references (PubMed
    IDs); this way the information which reference comes from which resource will
    be lost and the PubMed IDs will be unique.
exclude
    Character: datasets or resources to exclude.
...
    Optional additional arguments.

```

**Value**

A dataframe containing TF-target interactions.

**See Also**

- [get\\_interaction\\_resources](#)
- [import\\_all\\_interactions](#)
- [interaction\\_graph](#)
- [print\\_interactions](#)

**Examples**

```

interactions <-
  import_transcriptional_interactions(
    resources = c('PAZAR', 'ORegAnno', 'DoRothEA')
  )

```

---

inbiomap\_download      *Downloads and preprocesses network data from InWeb InBioMap*

---

**Description**

Downloads the data by [inbiomap\\_raw](#), extracts the UniProt IDs, Gene Symbols and scores and removes the irrelevant columns.

**Usage**

```
inbiomap_download(...)
```

**Arguments**

```
...                    Passed to inbiomap\_raw.
```

**Value**

A data frame (tibble) of interactions.



**See Also**[inbiomap\\_raw](#)**Examples**

```

inbiomap_interactions <- inbiomap_download()
inbiomap_interactions

# # A tibble: 625,641 x 7
#   uniprot_a uniprot_b genesymbol_a genesymbol_b inferred score1 score2
#   <chr>     <chr>     <chr>         <chr>         <lgl>   <dbl> <dbl>
# 1 A0A5B9    P01892     TRBC2         HLA-A         FALSE    0.417 0.458
# 2 A0AUZ9    Q96CV9     KANSL1L       OPTN           FALSE    0.155 0.0761
# 3 A0AV02    P24941     SLC12A8       CDK2           TRUE     0.156 0.0783
# 4 A0AV02    Q00526     SLC12A8       CDK3           TRUE     0.157 0.0821
# 5 A0AV96    P0CG48     RBM47         UBC            FALSE    0.144 0.0494
# # . with 625,631 more rows

```

inbiomap\_raw

*Downloads network data from InWeb InBioMap***Description**

Downloads the data from <https://inbio-discover.com/map.html#downloads> in tar.gz format, extracts the PSI MITAB table and returns it as a data frame.

**Usage**

```
inbiomap_raw(curl_verbose = FALSE)
```

**Arguments**

`curl_verbose` Logical. Perform CURL requests in verbose mode for debugging purposes.

**Value**

A data frame (tibble) with the extracted interaction table.

**See Also**[inbiomap\\_download](#)**Examples**

```
inbiomap_psimitab <- inbiomap_raw()
```

---

interaction_graph	<i>Build Omnipath interaction graph</i>
-------------------	---

---

### Description

Transforms the interactions data frame to an igraph graph object.

### Usage

```
interaction_graph(interactions = interactions)
```

### Arguments

interactions    data.frame created by

- `import_omnipath_enzsub`
- `import_omnipath_interactions`
- `import_pathwayextra_interactions`
- `import_kinaseextra_interactions`
- `import_ligreextra_interactions`
- `import_post_translational_interactions`
- `import_dorothea_interactions`
- `import_tf_target_interactions`
- `import_transcriptional_interactions`
- `import_mirnatarget_interactions`
- `import_all_interactions`

### Value

An igraph graph object.

### See Also

- `import_omnipath_interactions`
- `import_pathwayextra_interactions`
- `import_kinaseextra_interactions`
- `import_ligreextra_interactions`
- `import_dorothea_interactions`
- `import_mirnatarget_interactions`
- `import_all_interactions`
- `giant_component`
- `find_all_paths`

**Examples**

```
interactions <- import_omnipath_interactions(resources = c('Signalink3'))
g <- interaction_graph(interactions)
```

---

intercell\_categories *Full list of intercell categories and resources*

---

**Description**

Full list of intercell categories and resources

**Usage**

```
intercell_categories()
```

**Value**

A data frame of categories and resources.

**Examples**

```
ic_cat <- intercell_categories()
ic_cat
# # A tibble: 1,125 x 3
#   category          parent          database
#   <chr>             <chr>             <chr>
# 1 transmembrane    transmembrane     UniProt_location
# 2 transmembrane    transmembrane     UniProt_topology
# 3 transmembrane    transmembrane     UniProt_keyword
# 4 transmembrane    transmembrane_predicted Phobius
# 5 transmembrane_phobius transmembrane_predicted Almen2009
# # . with 1,120 more rows
```

---

intercell\_consensus\_filter  
*Quality filter for intercell annotations*

---

**Description**

Quality filter for intercell annotations

**Usage**

```
intercell_consensus_filter(data, percentile = NULL, loc_percentile = NULL)
```

**Arguments**

data	A data frame with intercell annotations, as provided by <a href="#">import_omnipath_intercell</a> .
percentile	Numeric: a percentile cut off for the consensus score of composite categories. The consensus score is the number of resources supporting the classification of an entity into a category based on combined information of many resources. Here you can apply a cut-off, keeping only the annotations supported by a higher number of resources than a certain percentile of each category. If NULL no filtering will be performed. The value is either in the 0-1 range, or will be divided by 100 if greater than 1. The percentiles will be calculated against the generic composite categories and then will be applied to their resource specific annotations and specific child categories.
loc_percentile	Numeric: similar to percentile for major localizations. For example, with a value of 50, the secreted, plasma membrane transmembrane or peripheral attributes will be TRUE only where at least 50 percent of the resources support these.

**Value**

The data frame in data filtered by the consensus scores.

**Examples**

```
intercell <- import_omnipath_intercell(parent = c('ligand', 'receptor'))
nrow(intercell)
# [1] 50174
intercell_q50 <- intercell_consensus_filter(intercell, 50)
nrow(intercell_q50)
# [1] 42863
```

---

is_ontology_id	<i>Looks like an ontology ID</i>
----------------	----------------------------------

---

**Description**

Tells if the input has the typical format of ontology IDs, i.e. a code of capital letters, a colon, followed by a numeric code.

**Usage**

```
is_ontology_id(terms)
```

**Arguments**

terms	Character vector with strings to check.
-------	---

**Value**

A logical vector with the same length as the input.

**Examples**

```
is_ontology_id(c('GO:000001', 'reproduction'))  
# [1] TRUE FALSE
```

---

kegg\_info

*Information about a KEGG Pathway*

---

**Description**

Information about a KEGG Pathway

**Usage**

```
kegg_info(pathway_id)
```

**Arguments**

pathway\_id      Character: a KEGG Pathway identifier, e.g. "hsa04710". For a complete list of IDs see [kegg\\_pathway\\_list](#).

**Value**

List with the pathway information.

**See Also**

- [kegg\\_pathway\\_list](#)
- [kegg\\_picture](#)
- [kegg\\_open](#)

**Examples**

```
kegg_info('map00563')
```

---

`kegg_open`*Open a KEGG Pathway diagram in the browser*

---

### Description

Open a KEGG Pathway diagram in the browser

### Usage

```
kegg_open(pathway_id)
```

### Arguments

`pathway_id` Character: a KEGG Pathway identifier, e.g. "hsa04710". For a complete list of IDs see [kegg\\_pathway\\_list](#).

### Details

To open URLs in the web browser the "browser" option must to be set to a a valid executable. You can check the value of this option by `getOption("browser")`. If your browser is firefox and the executable is located in the system path, you can set the option to point to it: `options(browser = "firefox")`. To make it a permanent setting, you can also include this in your `.Rprofile` file.

### Value

Returns NULL.

### See Also

- [kegg\\_pathway\\_list](#)
- [kegg\\_picture](#)
- [kegg\\_info](#)

### Examples

```
if(any(getOption('browser') != '')) kegg_open('hsa04710')
```

---

`kegg_pathways_download`*Download the KEGG Pathways database*

---

**Description**

Downloads all pathway diagrams in the KEGG Pathways database in KGML format and processes the XML to extract the interactions.

**Usage**

```
kegg_pathways_download(max_expansion = NULL, simplify = FALSE)
```

**Arguments**

`max_expansion` Numeric: the maximum number of relations derived from a single relation record. As one entry might represent more than one molecular entities, one relation might yield a large number of relations in the processing. This happens in a combinatorial way, e.g. if the two entries represent 3 and 4 entities, that results 12 relations. If NULL, all relations will be expanded.

`simplify` Logical: remove KEGG's internal identifiers and the pathway annotations, keep only unique interactions with direction and effect sign.

**Value**

A data frame (tibble) of interactions.

**See Also**

- [kegg\\_pathway\\_list](#)
- [kegg\\_process](#)
- [kegg\\_pathway\\_download](#)

**Examples**

```
kegg_pw <- kegg_pathways_download(simplify = TRUE)
kegg_pw
# # A tibble: 6,765 x 6
#   uniprot_source uniprot_target type effect genesymbol_source
#   <chr>          <chr>      <chr> <chr> <chr>
# 1 Q03113        Q15283      PPre1 activ. GNA12
# 2 Q9Y4G8        P62070      PPre1 activ. RAPGEF2
# 3 Q13972        P62070      PPre1 activ. RASGRF1
# 4 O95267        P62070      PPre1 activ. RASGRP1
# 5 P62834        P15056      PPre1 activ. RAP1A
# # . with 6,760 more rows, and 1 more variable: genesymbol_target <chr>
```

---

kegg\_pathway\_annotations

*Protein pathway annotations*

---

## Description

Downloads all KEGG pathways and creates a table of protein-pathway annotations.

## Usage

```
kegg_pathway_annotations(pathways = NULL)
```

## Arguments

pathways            A table of KEGG pathways as produced by [kegg\\_pathways\\_download](#).

## Value

A data frame (tibble) with UniProt IDs and pathway names.

## See Also

[kegg\\_pathways\\_download](#)

## Examples

```
kegg_pw_annot <- kegg_pathway_annotations()
kegg_pw_annot
# # A tibble: 7,341 x 4
#   uniprot genesymbol pathway           pathway_id
#   <chr>   <chr>      <chr>           <chr>
# 1 Q03113 GNA12      MAPK signaling pathway hsa04010
# 2 Q9Y4G8 RAPGEF2    MAPK signaling pathway hsa04010
# 3 Q13972 RASGRF1    MAPK signaling pathway hsa04010
# 4 O95267 RASGRP1    MAPK signaling pathway hsa04010
# 5 P62834 RAP1A      MAPK signaling pathway hsa04010
# # . with 7,336 more rows
```



---

kegg\_pathway\_download *Download one KEGG pathway*

---

## Description

Downloads one pathway diagram from the KEGG Pathways database in KGML format and processes the XML to extract the interactions.

## Usage

```
kegg_pathway_download(  
  pathway_id,  
  process = TRUE,  
  max_expansion = NULL,  
  simplify = FALSE  
)
```

## Arguments

pathway_id	Character: a KEGG pathway identifier, for example "hsa04350".
process	Logical: process the data or return it in raw format. processing means joining the entries and relations into a single data frame and adding UniProt IDs.
max_expansion	Numeric: the maximum number of relations derived from a single relation record. As one entry might represent more than one molecular entities, one relation might yield a large number of relations in the processing. This happens in a combinatorial way, e.g. if the two entries represent 3 and 4 entities, that results 12 relations. If NULL, all relations will be expanded.
simplify	Logical: remove KEGG's internal identifiers and the pathway annotations, keep only unique interactions with direction and effect sign.

## Value

A data frame (tibble) of interactions if process is TRUE, otherwise a list with two data frames: "entries" is a raw table of the entries while "relations" is a table of relations extracted from the KGML file.

## See Also

- [kegg\\_process](#)
- [kegg\\_pathways\\_download](#)
- [kegg\\_pathway\\_list](#)

**Examples**

```

tgf_pathway <- kegg_pathway_download('hsa04350')
tgf_pathway
# # A tibble: 50 x 12
#   source target type effect arrow relation_id kegg_id_source
#   <chr> <chr> <chr> <chr> <chr> <chr> <chr>
# 1 51 49 PPre1 activ. --> hsa04350:1 hsa:7040 hsa:.
# 2 57 55 PPre1 activ. --> hsa04350:2 hsa:151449 hs.
# 3 34 32 PPre1 activ. --> hsa04350:3 hsa:3624 hsa:.
# 4 20 17 PPre1 activ. --> hsa04350:4 hsa:4838
# 5 60 46 PPre1 activ. --> hsa04350:5 hsa:4086 hsa:.
# # . with 45 more rows, and 5 more variables: genesymbol_source <chr>,
# #   uniprot_source <chr>, kegg_id_target <chr>,
# #   genesymbol_target <chr>, uniprot_target <chr>

```

---

kegg\_pathway\_list      *List of KEGG pathways*

---

**Description**

Retrieves a list of available KEGG pathways.

**Usage**

```
kegg_pathway_list()
```

**Value**

Data frame of pathway names and identifiers.

**See Also**

- [kegg\\_process](#)
- [kegg\\_pathway\\_download](#)
- [kegg\\_pathways\\_download](#)
- [kegg\\_open](#)
- [kegg\\_picture](#)
- [kegg\\_info](#)

**Examples**

```

kegg_pws <- kegg_pathway_list()
kegg_pws
# # A tibble: 521 x 2
#   id      name
#   <chr> <chr>

```

```
# 1 map01100 Metabolic pathways
# 2 map01110 Biosynthesis of secondary metabolites
# 3 map01120 Microbial metabolism in diverse environments
# 4 map01200 Carbon metabolism
# 5 map01210 2-Oxocarboxylic acid metabolism
# 6 map01212 Fatty acid metabolism
# 7 map01230 Biosynthesis of amino acids
# # . with 514 more rows
```

---

kegg\_picture

*Download a pathway diagram as a picture*

---

### Description

Downloads a KEGG Pathway diagram as a PNG image.

### Usage

```
kegg_picture(pathway_id, path = NULL)
```

### Arguments

pathway_id	Character: a KEGG Pathway identifier, e.g. "hsa04710". For a complete list of IDs see <a href="#">kegg_pathway_list</a> .
path	Character: save the image to this path. If NULL, the image will be saved in the current directory under the name <pathway_id>.png.

### Value

Invisibly returns the path to the downloaded file.

### See Also

[kegg\\_pathway\\_list](#)

- [kegg\\_pathway\\_list](#)
- [kegg\\_open](#)
- [kegg\\_info](#)

### Examples

```
kegg_picture('hsa04710')
kegg_picture('hsa04710', path = 'foo/bar')
kegg_picture('hsa04710', path = 'foo/bar/circadian.png')
```

kegg\_process

*Interactions from KGML***Description**

Processes KEGG Pathways data extracted from a KGML file. Joins the entries and relations into a single data frame and translates the Gene Symbols to UniProt IDs.

**Usage**

```
kegg_process(entries, relations, max_expansion = NULL, simplify = FALSE)
```

**Arguments**

entries	A data frames with entries extracted from a KGML file by <a href="#">kegg_pathway_download</a> .
relations	A data frames with relations extracted from a KGML file by <a href="#">kegg_pathway_download</a> .
max_expansion	Numeric: the maximum number of relations derived from a single relation record. As one entry might represent more than one molecular entities, one relation might yield a large number of relations in the processing. This happens in a combinatorial way, e.g. if the two entries represent 3 and 4 entities, that results 12 relations. If NULL, all relations will be expanded.
simplify	Logical: remove KEGG's internal identifiers and the pathway annotations, keep only unique interactions with direction and effect sign.

**Value**

A data frame (tibble) of interactions. In rare cases when a pathway doesn't contain any relation, returns NULL.

**See Also**

- [kegg\\_pathway\\_download](#)
- [kegg\\_pathways\\_download](#)
- [kegg\\_pathway\\_list](#)

**Examples**

```
hsa04350 <- kegg_pathway_download('hsa04350', process = FALSE)
tgf_pathway <- kegg_process(hsa04350$entries, hsa04350$relations)
tgf_pathway
# # A tibble: 50 x 12
#   source target type effect arrow relation_id kegg_id_source
#   <chr> <chr> <chr> <chr> <chr> <chr> <chr>
# 1 51 49 PPre1 activ. --> hsa04350:1 hsa:7040 hsa:.
# 2 57 55 PPre1 activ. --> hsa04350:2 hsa:151449 hs.
# 3 34 32 PPre1 activ. --> hsa04350:3 hsa:3624 hsa:.
# 4 20 17 PPre1 activ. --> hsa04350:4 hsa:4838
```

```
# 5 60    46    PPre1 activ. --> hsa04350:5 hsa:4086 hsa:.  
# # . with 45 more rows, and 5 more variables: genesymbol_source <chr>,  
# # uniprot_source <chr>, kegg_id_target <chr>,  
# # genesymbol_target <chr>, uniprot_target <chr>
```

---

load\_db

*Load a built in database*

---

## Description

Load a built in database

## Usage

```
load_db(key, param = list())
```

## Arguments

**key** Character: the key of the database to load. For a list of available keys see [omnipath\\_show\\_db](#).

**param** List: override the defaults or pass further parameters to the database loader function. See the loader functions and their default parameters in [omnipath\\_show\\_db](#).

## Details

This function loads a database which is stored within the package namespace until its expiry. The loaded database is accessible by [get\\_db](#) and the loading process is typically initiated by [get\\_db](#), not by the users directly.

## Value

Returns NULL.

## See Also

[omnipath\\_show\\_db](#).

## Examples

```
load_db('go_slim')  
omnipath_show_db()
```

---

nichenet\_build\_model *Construct a NicheNet ligand-target model*

---

### Description

Construct a NicheNet ligand-target model

### Usage

```
nichenet_build_model(optimization_results, networks, use_weights = TRUE)
```

### Arguments

`optimization_results` The outcome of NicheNet parameter optimization as produced by [nichenet\\_optimization](#).

`networks` A list with NicheNet format signaling, ligand-receptor and gene regulatory networks as produced by [nichenet\\_networks](#).

`use_weights` Logical: whether to use the optimized weights.

### Value

A named list with two elements: ‘weighted\_networks’ and ‘optimized\_parameters’.

### Examples

```
expression <- nichenet_expression_data()

networks <- nichenet_networks()
optimization_results <- nichenet_optimization(networks, expression)
nichenet_model <- nichenet_build_model(optimization_results, networks)
```

---

nichenet\_expression\_data  
*Expression data from ligand-receptor perturbation experiments used by NicheNet*

---

### Description

NicheNet uses expression data from a collection of published ligand or receptor KO or perturbation experiments to build its model. This function retrieves the original expression data, deposited in Zenodo (<https://zenodo.org/record/3260758>).

### Usage

```
nichenet_expression_data()
```

**Value**

Nested list, each element contains a data frame of processed expression data and key variables about the experiment.

**Examples**

```
exp_data <- nichenet_expression_data()
head(names(exp_data))
# [1] "bmp4_tgfb"      "tgfb_bmp4"      "nodal_Nodal"    "spectrum_IL4"
# [5] "spectrum_Tnf"  "spectrum_Ifng"
purrr::map_chr(head(exp_data), 'from')
#   bmp4_tgfb      tgfb_bmp4    nodal_Nodal  spectrum_IL4  spectrum_Tnf
#   "BMP4"        "TGFB1"      "NODAL"      "IL4"         "TNF"
# spectrum_Ifng
#   "IFNG"
```

---

nichenet\_gr\_network     *Builds a NicheNet gene regulatory network*

---

**Description**

Builds gene regulatory network prior knowledge for NicheNet using multiple resources.

**Usage**

```
nichenet_gr_network(
  omnipath = list(),
  harmonizome = list(),
  regnetwork = list(),
  htridb = list(),
  remap = list(),
  evex = list(),
  pathwaycommons = list(),
  trrust = list(),
  only_omnipath = FALSE
)
```

**Arguments**

omnipath	List with paramaters to be passed to <a href="#">nichenet_gr_network_omnipath</a> .
harmonizome	List with paramaters to be passed to <a href="#">nichenet_gr_network_harmonizome</a> .
regnetwork	List with paramaters to be passed to <a href="#">nichenet_gr_network_regnetwork</a> .
htridb	List with paramaters to be passed to <a href="#">nichenet_gr_network_htridb</a> .
remap	List with paramaters to be passed to <a href="#">nichenet_gr_network_remap</a> .
evex	List with paramaters to be passed to <a href="#">nichenet_gr_network_evex</a> .

pathwaycommons List with paramaters to be passed to [nichenet\\_gr\\_network\\_pathwaycommons](#).  
trrust List with paramaters to be passed to [nichenet\\_gr\\_network\\_trrust](#).  
only\_omnipath Logical: a shortcut to use only OmniPath as network resource.

### Value

A network data frame (tibble) with gene regulatory interactions suitable for use with NicheNet.

### See Also

- [nichenet\\_gr\\_network\\_evex](#)
- [nichenet\\_gr\\_network\\_harmonizome](#)
- [nichenet\\_gr\\_network\\_htridb](#)
- [nichenet\\_gr\\_network\\_omnipath](#)
- [nichenet\\_gr\\_network\\_pathwaycommons](#)
- [nichenet\\_gr\\_network\\_regnetwork](#)
- [nichenet\\_gr\\_network\\_remap](#)
- [nichenet\\_gr\\_network\\_trrust](#)

### Examples

```
# load everything with the default parameters:
gr_network <- nichenet_gr_network()

# less targets from ReMap, not using RegNetwork:
gr_network <- nichenet_gr_network(
  # I needed to disable ReMap here due to some issues
  # of one of the Bioconductor build servers
  # remap = list(top_targets = 200),
  remap = NULL,
  regnetwork = NULL,
)

# use only OmniPath:
gr_network_omnipath <- nichenet_gr_network(only_omnipath = TRUE)
```

---

nichenet\_gr\_network\_evex

*NicheNet gene regulatory network from EVEX*

---

### Description

Builds a gene regulatory network using data from the EVEX database and converts it to a format suitable for NicheNet.



**Usage**

```
nichenet_gr_network_evex(  
  top_confidence = 0.75,  
  indirect = FALSE,  
  regulation_of_expression = FALSE  
)
```

**Arguments**

`top_confidence` Double, between 0 and 1. Threshold based on the quantile of the confidence score.

`indirect` Logical: whether to include indirect interactions.

`regulation_of_expression` Logical: whether to include also the "regulation of expression" type interactions.

**Value**

Data frame of interactions in NicheNet format.  
Data frame with gene regulatory interactions in NicheNet format.

**See Also**

- [nichenet\\_gr\\_network](#)
- [evex\\_download](#)

**Examples**

```
# use only the 10% with the highest confidence:  
evex_gr_network <- nichenet_gr_network_evex(top_confidence = .9)
```

---

nichenet\_gr\_network\_harmonizome

*NicheNet gene regulatory network from Harmonizome*

---

**Description**

Builds gene regulatory network prior knowledge for NicheNet using Harmonizome

**Usage**

```
nichenet_gr_network_harmonizome(  
  datasets = c("cheappi", "encodetfppi", "jasparpwm", "transfac", "transfacpwm",  
    "motifmap", "geotf", "geokinase", "geogene"),  
  ...  
)
```

**Arguments**

datasets        The datasets to use. For possible values please refer to default value and the Harmonizome webpage.  
...            Ignored.

**Value**

Data frame with gene regulatory interactions in NicheNet format.

**See Also**

- [nichenet\\_gr\\_network](#)
- [harmonizome\\_download](#)

**Examples**

```
# use only JASPAR and TRANSFAC:  
hz_gr_network <- nichenet_gr_network_harmonizome(  
  datasets = c('jasparpwm', 'transfac', 'transfacpwm')  
)
```

---

nichenet\_gr\_network\_htridb

*NicheNet gene regulatory network from HTRIdb*

---

**Description**

Builds a gene regulatory network using data from the HTRIdb database and converts it to a format suitable for NicheNet.

**Usage**

```
nichenet_gr_network_htridb()
```

**Value**

Data frame with gene regulatory interactions in NicheNet format.

**See Also**

[htridb\\_download](#), [nichenet\\_gr\\_network](#)

**Examples**

```
htri_gr_network <- nichenet_gr_network_htridb()
```

---

`nichenet_gr_network_omnipath`*Builds gene regulatory network for NicheNet using OmniPath*

---

### Description

Retrieves network prior knowledge from OmniPath and provides it in a format suitable for NicheNet. This method never downloads the ‘ligreextra’ dataset because the ligand-receptor interactions are supposed to come from [nichenet\\_lr\\_network\\_omnipath](#).

### Usage

```
nichenet_gr_network_omnipath(min_curation_effort = 0, ...)
```

### Arguments

<code>min_curation_effort</code>	Lower threshold for curation effort
<code>...</code>	Passed to <a href="#">import_transcriptional_interactions</a>

### Value

A network data frame (tibble) with gene regulatory interactions suitable for use with NicheNet.

### See Also

- [nichenet\\_gr\\_network\\_evex](#)
- [nichenet\\_gr\\_network\\_harmonizome](#)
- [nichenet\\_gr\\_network\\_htridb](#)
- [nichenet\\_gr\\_network\\_omnipath](#)
- [nichenet\\_gr\\_network\\_pathwaycommons](#)
- [nichenet\\_gr\\_network\\_regnetwork](#)
- [nichenet\\_gr\\_network\\_remap](#)
- [nichenet\\_gr\\_network\\_trust](#)

### Examples

```
# use interactions up to confidence level "C" from DoRothEA:  
op_gr_network <- nichenet_gr_network_omnipath(  
  dorothea_levels = c('A', 'B', 'C')  
)
```

---

nichenet\_gr\_network\_pathwaycommons

*NicheNet gene regulatory network from PathwayCommons*

---

### Description

Builds gene regulation prior knowledge for NicheNet using PathwayCommons.

### Usage

```
nichenet_gr_network_pathwaycommons(  
  interaction_types = "controls-expression-of",  
  ...  
)
```

### Arguments

`interaction_types` Character vector with PathwayCommons interaction types. Please refer to the default value and the PathwayCommons webpage.

`...` Ignored.

### Value

Data frame with gene regulatory interactions in NicheNet format.

### See Also

- [nichenet\\_gr\\_network](#)
- [pathwaycommons\\_download](#)

### Examples

```
pc_gr_network <- nichenet_gr_network_pathwaycommons()
```

---

nichenet\_gr\_network\_regnetwork

*NicheNet gene regulatory network from RegNetwork*

---

### Description

Builds a gene regulatory network using data from the RegNetwork database and converts it to a format suitable for NicheNet.

**Usage**

```
nichenet_gr_network_regnetwork()
```

**Value**

Data frame with gene regulatory interactions in NicheNet format.

**See Also**

- [regnetwork\\_download](#)
- [nichenet\\_gr\\_network](#)

**Examples**

```
regn_gr_network <- nichenet_gr_network_regnetwork()
```

---

nichenet\_gr\_network\_remap

*NicheNet gene regulatory network from ReMap*

---

**Description**

Builds a gene regulatory network using data from the ReMap database and converts it to a format suitable for NicheNet.

**Usage**

```
nichenet_gr_network_remap(  
  score = 100,  
  top_targets = 500,  
  only_known_tfs = TRUE  
)
```

**Arguments**

score	Numeric: a minimum score between 0 and 1000, records with lower scores will be excluded. If NULL no filtering performed.
top_targets	Numeric: the number of top scoring targets for each TF. Essentially the maximum number of targets per TF. If NULL the number of targets is not restricted.
only_known_tfs	Logical: whether to exclude TFs which are not in TF census.

**Value**

Data frame with gene regulatory interactions in NicheNet format.

**See Also**

- [remap\\_filtered](#)
- [nichenet\\_gr\\_network](#)

**Examples**

```
# use only max. top 100 targets for each TF:  
remap_gr_network <- nichenet_gr_network_remap(top_targets = 100)
```

---

nichenet\_gr\_network\_trrust

*NicheNet gene regulatory network from TRRUST*

---

**Description**

Builds a gene regulatory network using data from the TRRUST database and converts it to a format suitable for NicheNet.

**Usage**

```
nichenet_gr_network_trrust()
```

**Value**

Data frame with gene regulatory interactions in NicheNet format.

**See Also**

- [trrust\\_download](#)
- [nichenet\\_gr\\_network](#)

**Examples**

```
trrust_gr_network <- nichenet_gr_network_trrust()
```

---

`nichenet_ligand_activities`*Calls the NicheNet ligand activity analysis*

---

## Description

Calls the NicheNet ligand activity analysis

## Usage

```
nichenet_ligand_activities(  
  ligand_target_matrix,  
  lr_network,  
  expressed_genes_transmitter,  
  expressed_genes_receiver,  
  genes_of_interest,  
  background_genes = NULL,  
  n_top_ligands = 42,  
  n_top_targets = 250  
)
```

## Arguments

`ligand_target_matrix`

A matrix with rows and columns corresponding to ligands and targets, respectively. Produced by `nichenet_ligand_target_matrix` or `nichenetr::construct_ligand_target_ma`

`lr_network`

A data frame with ligand-receptor interactions, as produced by `nichenet_lr_network`.

`expressed_genes_transmitter`

Character vector with the gene symbols of the genes expressed in the cells transmitting the signal.

`expressed_genes_receiver`

Character vector with the gene symbols of the genes expressed in the cells receiving the signal.

`genes_of_interest`

Character vector with the gene symbols of the genes of interest. These are the genes in the receiver cell population that are potentially affected by ligands expressed by interacting cells (e.g. genes differentially expressed upon cell-cell interaction).

`background_genes`

Character vector with the gene symbols of the genes to be used as background.

`n_top_ligands`

How many of the top ligands to include in the ligand-target table.

`n_top_targets`

For each ligand, how many of the top targets to include in the ligand-target table.

**Value**

A named list with 'ligand\_activities' (a tibble giving several ligand activity scores; following columns in the tibble: \$stest\_ligand, \$sauroc, \$saupr and \$pearson) and 'ligand\_target\_links' (a tibble with columns ligand, target and weight (i.e. regulatory potential score)).

**Examples**

```
networks <- nichenet_networks()
expression <- nichenet_expression_data()
optimization_results <- nichenet_optimization(networks, expression)
nichenet_model <- nichenet_build_model(optimization_results, networks)
lt_matrix <- nichenet_ligand_target_matrix(
  nichenet_model$weighted_networks,
  networks$lr_network,
  nichenet_model$optimized_parameters
)
ligand_activities <- nichenet_ligand_activities(
  ligand_target_matrix = lt_matrix,
  lr_network = networks$lr_network,
  # the rest of the parameters should come
  # from your transcriptomics data:
  expressed_genes_transmitter = expressed_genes_transmitter,
  expressed_genes_receiver = expressed_genes_receiver,
  genes_of_interest = genes_of_interest
)
```

---

nichenet\_ligand\_target\_links

*Compiles a table with weighted ligand-target links*

---

**Description**

A wrapper around `nichenetr::get_weighted_ligand_target_links` to compile a data frame with weighted links from the top ligands to their top targets.

**Usage**

```
nichenet_ligand_target_links(
  ligand_activities,
  ligand_target_matrix,
  genes_of_interest,
  n_top_ligands = 42,
  n_top_targets = 250
)
```



**Arguments**

- `ligand_activities`  
Ligand activity table as produced by `nichenetr::predict_ligand_activities`.
- `ligand_target_matrix`  
Ligand-target matrix as produced by `nichenetr::construct_ligand_target_matrix` or the wrapper around it in the current package: `nichenet_ligand_target_matrix`.
- `genes_of_interest`  
Character vector with the gene symbols of the genes of interest. These are the genes in the receiver cell population that are potentially affected by ligands expressed by interacting cells (e.g. genes differentially expressed upon cell-cell interaction).
- `n_top_ligands` How many of the top ligands to include in the ligand-target table.
- `n_top_targets` For each ligand, how many of the top targets to include in the ligand-target table.

**Value**

A tibble with columns `ligand`, `target` and `weight` (i.e. regulatory potential score).

**Examples**

```
networks <- nichenet_networks()
expression <- nichenet_expression_data()
optimization_results <- nichenet_optimization(networks, expression)
nichenet_model <- nichenet_build_model(optimization_results, networks)
lt_matrix <- nichenet_ligand_target_matrix(
  nichenet_model$weighted_networks,
  networks$lr_network,
  nichenet_model$optimized_parameters
)
ligand_activities <- nichenet_ligand_activities(
  ligand_target_matrix = lt_matrix,
  lr_network = networks$lr_network,
  # the rest of the parameters should come
  # from your transcriptomics data:
  expressed_genes_transmitter = expressed_genes_transmitter,
  expressed_genes_receiver = expressed_genes_receiver,
  genes_of_interest = genes_of_interest
)
lt_links <- nichenet_ligand_target_links(
  ligand_activities = ligand_activities,
  ligand_target_matrix = lt_matrix,
  genes_of_interest = genes_of_interest,
  n_top_ligands = 20,
  n_top_targets = 100
)
```

---

```
nichenet_ligand_target_matrix
```

*Creates a NicheNet ligand-target matrix*

---

### Description

Creates a NicheNet ligand-target matrix

### Usage

```
nichenet_ligand_target_matrix(  
  weighted_networks,  
  lr_network,  
  optimized_parameters,  
  use_weights = TRUE,  
  construct_ligand_target_matrix_param = list()  
)
```

### Arguments

<code>weighted_networks</code>	Weighted networks as provided by <a href="#">nichenet_build_model</a> .
<code>lr_network</code>	A data frame with ligand-receptor interactions, as produced by <a href="#">nichenet_lr_network</a> .
<code>optimized_parameters</code>	The outcome of NicheNet parameter optimization as produced by <a href="#">nichenet_build_model</a> .
<code>use_weights</code>	Logical: whether the network sources are weighted. In this function it only affects the output file name.
<code>construct_ligand_target_matrix_param</code>	Override parameters for <code>nichenetr::construct_ligand_target_matrix</code> .

### Value

A matrix containing ligand-target probability scores.

### Examples

```
networks <- nichenet_networks()  
expression <- nichenet_expression_data()  
optimization_results <- nichenet_optimization(networks, expression)  
nichenet_model <- nichenet_build_model(optimization_results, networks)  
lt_matrix <- nichenet_ligand_target_matrix(  
  nichenet_model$weighted_networks,  
  networks$lr_network,  
  nichenet_model$optimized_parameters  
)
```

---

nichenet\_lr\_network *Builds a NicheNet ligand-receptor network*

---

## Description

Builds ligand-receptor network prior knowledge for NicheNet using multiple resources.

## Usage

```
nichenet_lr_network(  
  omnipath = list(),  
  guide2pharma = list(),  
  ramilowski = list(),  
  only_omnipath = FALSE,  
  quality_filter_param = list()  
)
```

## Arguments

**omnipath** List with parameters to be passed to [nichenet\\_lr\\_network\\_omnipath](#).

**guide2pharma** List with parameters to be passed to [nichenet\\_lr\\_network\\_guide2pharma](#).

**ramilowski** List with parameters to be passed to [nichenet\\_lr\\_network\\_ramilowski](#).

**only\_omnipath** Logical: a shortcut to use only OmniPath as network resource.

**quality\_filter\_param** Arguments for [filter\\_intercell\\_network](#) (quality filtering of the OmniPath ligand-receptor network). It is recommended to check these parameters and apply some quality filtering. The defaults already ensure certain filtering, but you might want more relaxed or stringent options.

## Value

A network data frame (tibble) with ligand-receptor interactions suitable for use with NicheNet.

## See Also

- [nichenet\\_lr\\_network\\_omnipath](#)
- [nichenet\\_lr\\_network\\_guide2pharma](#)
- [nichenet\\_lr\\_network\\_ramilowski](#)
- [filter\\_intercell\\_network](#)

**Examples**

```
# load everything with the default parameters:
lr_network <- nichenet_lr_network()

# don't use Ramilowski:
lr_network <- nichenet_lr_network(ramilowski = NULL)

# use only OmniPath:
lr_network_omnipath <- nichenet_lr_network(only_omnipath = TRUE)
```

---

nichenet\_lr\_network\_guide2pharma

*Ligand-receptor network from Guide to Pharmacology*

---

**Description**

Downloads ligand-receptor interactions from the Guide to Pharmacology database and converts it to a format suitable for NicheNet.

**Usage**

```
nichenet_lr_network_guide2pharma()
```

**Value**

Data frame with ligand-receptor interactions in NicheNet format.

**See Also**

[nichenet\\_lr\\_network\\_guide2pharma\\_download](#)

**Examples**

```
g2p_lr_network <- nichenet_lr_network_guide2pharma()
```

---

`nichenet_lr_network_omnipath`*Builds ligand-receptor network for NicheNet using OmniPath*

---

## Description

Retrieves network prior knowledge from OmniPath and provides it in a format suitable for NicheNet. This method never downloads the ‘ligreextra’ dataset because the ligand-receptor interactions are supposed to come from [nichenet\\_lr\\_network\\_omnipath](#).

## Usage

```
nichenet_lr_network_omnipath(quality_filter_param = list(), ...)
```

## Arguments

`quality_filter_param`

List with arguments for [filter\\_intercell\\_network](#). It is recommended to check these parameters and apply some quality filtering. The defaults already ensure certain filtering, but you might want more relaxed or stringent options.

`...`

Passed to [import\\_intercell\\_network](#)

## Value

A network data frame (tibble) with ligand-receptor interactions suitable for use with NicheNet.

## See Also

- [nichenet\\_lr\\_network](#)
- [import\\_intercell\\_network](#)

## Examples

```
# use only ligand-receptor interactions (not for example ECM-adhesion):
op_lr_network <- nichenet_lr_network_omnipath(ligand_receptor = TRUE)

# use only CellPhoneDB and Guide to Pharmacology:
op_lr_network <- nichenet_lr_network_omnipath(
  resources = c('CellPhoneDB', 'Guide2Pharma')
)

# only interactions where the receiver is a transporter:
op_lr_network <- nichenet_lr_network_omnipath(
  receiver_param = list(parent = 'transporter')
)
```

---

nichenet\_lr\_network\_ramilowski

*Ligand-receptor network from Ramilowski 2015*

---

## Description

Downloads ligand-receptor interactions from Supplementary Table 2 of the paper 'A draft network of ligand-receptor-mediated multicellular signalling in human' (Ramilowski et al. 2015, <https://www.nature.com/articles/ncomms8866>). It converts the downloaded table to a format suitable for NicheNet.

## Usage

```
nichenet_lr_network_ramilowski(  
  evidences = c("literature supported", "putative")  
)
```

## Arguments

evidences      Character: evidence types, "literature supported", "putative" or both.

## Value

Data frame with ligand-receptor interactions in NicheNet format.

## See Also

- [nichenet\\_lr\\_network](#)
- [ramilowski\\_download](#)

## Examples

```
# use only the literature supported data:  
rami_lr_network <- nichenet_lr_network_ramilowski(  
  evidences = 'literature supported'  
)
```

---

nichenet_main	<i>Executes the full NicheNet pipeline</i>
---------------	--

---

### Description

Builds all prior knowledge data required by NicheNet. For this it calls a multitude of methods to download and combine data from various databases according to the settings. The content of the prior knowledge data is highly customizable, see the documentation of the related functions. After the prior knowledge is ready, it performs parameter optimization to build a NicheNet model. This results a weighted ligand- target matrix. Then, considering the expressed genes from user provided data, a gene set of interest and background genes, it executes the NicheNet ligand activity analysis.

### Usage

```
nichenet_main(
  only_omnipath = FALSE,
  expressed_genes_transmitter = NULL,
  expressed_genes_receiver = NULL,
  genes_of_interest = NULL,
  background_genes = NULL,
  use_weights = TRUE,
  n_top_ligands = 42,
  n_top_targets = 250,
  signaling_network = list(),
  lr_network = list(),
  gr_network = list(),
  small = FALSE,
  tiny = FALSE,
  make_multi_objective_function_param = list(),
  objective_function_param = list(),
  mlrmo_optimization_param = list(),
  construct_ligand_target_matrix_param = list(),
  results_dir = NULL,
  quality_filter_param = list()
)
```

### Arguments

**only\_omnipath** Logical: use only OmniPath for network knowledge. This is a simple switch for convenience, further options are available by the other arguments. By default we use all available resources. The networks can be customized on a resource by resource basis, as well as providing custom parameters for individual resources, using the parameters ‘signaling\_network’, ‘lr\_network’ and ‘gr\_network’.

**expressed\_genes\_transmitter** Character vector with the gene symbols of the genes expressed in the cells transmitting the signal.

expressed_genes_receiver	Character vector with the gene symbols of the genes expressed in the cells receiving the signal.
genes_of_interest	Character vector with the gene symbols of the genes of interest. These are the genes in the receiver cell population that are potentially affected by ligands expressed by interacting cells (e.g. genes differentially expressed upon cell-cell interaction).
background_genes	Character vector with the gene symbols of the genes to be used as background.
use_weights	Logical: calculate and use optimized weights for resources (i.e. one resource seems to be better than another, hence the former is considered with a higher weight).
n_top_ligands	How many of the top ligands to include in the ligand-target table.
n_top_targets	How many of the top targets (for each of the top ligands) to consider in the ligand-target table.
signaling_network	A list of parameters for building the signaling network, passed to <a href="#">nichenet_signaling_network</a> .
lr_network	A list of parameters for building the ligand-receptor network, passed to <a href="#">nichenet_lr_network</a> .
gr_network	A list of parameters for building the gene regulatory network, passed to <a href="#">nichenet_gr_network</a> .
small	Logical: build a small network for testing purposes, using only OmniPath data. It is also a high quality network, it is reasonable to try the analysis with this small network.
tiny	Logical: build an even smaller network for testing purposes. As this involves random subsetting, it's not recommended to use this network for analysis.
make_multi_objective_function_param	Override parameters for <code>smoof::makeMultiObjectiveFunction</code> .
objective_function_param	Override additional arguments passed to the objective function.
mlrmo_optimization_param	Override arguments for <code>nichenetr::mlrmo_optimization</code> .
construct_ligand_target_matrix_param	Override parameters for <code>nichenetr::construct_ligand_target_matrix</code> .
results_dir	Character: path to the directory to save intermediate and final outputs from NicheNet methods.
quality_filter_param	Arguments for <a href="#">filter_intercell_network</a> (quality filtering of the OmniPath ligand-receptor network). It is recommended to check these parameters and apply some quality filtering. The defaults already ensure certain filtering, but you might want more relaxed or stringent options.

## Details

About *small* and *tiny* networks: Building a NicheNet model is computationally demanding, taking several hours to run. As this is related to the enormous size of the networks, to speed up testing we



can use smaller networks, around 1,000 times smaller, with few thousands of interactions instead of few millions. Random subsetting of the whole network would result disjunct fragments, instead we load only a few resources. To run the whole pipeline with tiny networks use [nichenet\\_test](#).

### Value

A named list with the intermediate and final outputs of the pipeline: 'networks', 'expression', 'optimized\_parameters', 'weighted\_networks' and 'ligand\_target\_matrix'.

### See Also

- [nichenet\\_networks](#)
- [nichenet\\_signaling\\_network](#)
- [nichenet\\_lr\\_network](#)
- [nichenet\\_gr\\_network](#)
- [nichenet\\_test](#)
- [nichenet\\_workarounds](#)
- [nichenet\\_results\\_dir](#)

### Examples

```
nichenet_results <- nichenet_main(  
  # altering some network resource parameters, the rest  
  # of the resources will be loaded according to the defaults  
  signaling_network = list(  
    cpdb = NULL, # this resource will be excluded  
    inbiomap = NULL,  
    evex = list(min_confidence = 1.0) # override some parameters  
  ),  
  gr_network = list(only_omnipath = TRUE),  
  n_top_ligands = 20,  
  # override the default number of CPU cores to use  
  mlrmo_optimization_param = list(ncores = 4)  
)
```

---

nichenet\_networks

*Builds NicheNet network prior knowledge*

---

### Description

Builds network knowledge required by NicheNet. For this it calls a multitude of methods to download and combine data from various databases according to the settings. The content of the prior knowledge data is highly customizable, see the documentation of the related functions.

**Usage**

```
nichenet_networks(
  signaling_network = list(),
  lr_network = list(),
  gr_network = list(),
  only_omnipath = FALSE,
  small = FALSE,
  tiny = FALSE,
  quality_filter_param = list()
)
```

**Arguments**

signaling_network	A list of parameters for building the signaling network, passed to <a href="#">nichenet_signaling_network</a>
lr_network	A list of parameters for building the ligand-receptor network, passed to <a href="#">nichenet_lr_network</a>
gr_network	A list of parameters for building the gene regulatory network, passed to <a href="#">nichenet_gr_network</a>
only_omnipath	Logical: a shortcut to use only OmniPath as network resource.
small	Logical: build a small network for testing purposes, using only OmniPath data. It is also a high quality network, it is reasonable to try the analysis with this small network.
tiny	Logical: build an even smaller network for testing purposes. As this involves random subsetting, it's not recommended to use this network for analysis.
quality_filter_param	Arguments for <a href="#">filter_intercell_network</a> (quality filtering of the OmniPath ligand-receptor network). It is recommended to check these parameters and apply some quality filtering. The defaults already ensure certain filtering, but you might want more relaxed or stringent options.

**Value**

A named list with three network data frames (tibbles): the signaling, the ligand-receptor (lr) and the gene regulatory (gr) networks.

**See Also**

- [nichenet\\_signaling\\_network](#)
- [nichenet\\_lr\\_network](#)
- [nichenet\\_gr\\_network](#)

**Examples**

```
networks <- nichenet_networks()
dplyr::sample_n(networks$gr_network, 10)
# # A tibble: 10 x 4
#   from   to     source      database
#   <chr> <chr> <chr>      <chr>
```

```

# 1 MAX      ALG3      harmonizome_ENCODE  harmonizome
# 2 MAX      IMPDH1    harmonizome_ENCODE  harmonizome
# 3 SMAD5    LCP1      Remap_5            Remap
# 4 HNF4A    TNFRSF19  harmonizome_CHEA    harmonizome
# 5 SMC3     FAP       harmonizome_ENCODE  harmonizome
# 6 E2F6     HIST1H1B  harmonizome_ENCODE  harmonizome
# 7 TFAP2C   MAT2B     harmonizome_ENCODE  harmonizome
# 8 USF1     TBX4     harmonizome_TRANSFAC harmonizome
# 9 MIR133B  FETUB    harmonizome_TRANSFAC harmonizome
# 10 SP4     HNRNPH2  harmonizome_ENCODE  harmonizome

# use only OmniPath:
omnipath_networks <- nichenet_networks(only_omnipath = TRUE)

```

---

nichenet\_optimization *Optimizes NicheNet model parameters*

---

## Description

Optimize NicheNet method parameters, i.e. PageRank parameters and source weights, based on a collection of experiments where the effect of a ligand on gene expression was measured.

## Usage

```

nichenet_optimization(
  networks,
  expression,
  make_multi_objective_function_param = list(),
  objective_function_param = list(),
  mlrmbo_optimization_param = list()
)

```

## Arguments

networks	A list with NicheNet format signaling, ligand-receptor and gene regulatory networks as produced by <a href="#">nichenet_networks</a> .
expression	A list with expression data from ligand perturbation experiments, as produced by <a href="#">nichenet_expression_data</a> .
make_multi_objective_function_param	Override parameters for <code>smoof::makeMultiObjectiveFunction</code> .
objective_function_param	Override additional arguments passed to the objective function.
mlrmbo_optimization_param	Override arguments for <code>nichenetr::mlrmbo_optimization</code> .

**Value**

A result object from the function 'mlrMBO::mbo'. Among other things, this contains the optimal parameter settings, the output corresponding to every input etc.

**Examples**

```
networks <- nichenet_networks()
expression <- nichenet_expression_data()
optimization_results <- nichenet_optimization(networks, expression)
```

---

nichenet\_remove\_orphan\_ligands

*Removes experiments with orphan ligands*

---

**Description**

Removes from the expression data the perturbation experiments involving ligands without connections.

**Usage**

```
nichenet_remove_orphan_ligands(expression, lr_network)
```

**Arguments**

expression      Expression data as returned by [nichenet\\_expression\\_data](#).  
lr\_network      A NicheNet format ligand-receptor network data frame as produced by [nichenet\\_lr\\_network](#).

**Value**

The same list as 'expression' with certain elements removed.

**Examples**

```
lr_network <- nichenet_lr_network()
expression <- nichenet_expression_data()
expression <- nichenet_remove_orphan_ligands(expression, lr_network)
```

---

nichenet\_results\_dir *Path to the current NicheNet results directory*

---

**Description**

Path to the directory to save intermediate and final outputs from NicheNet methods.

**Usage**

```
nichenet_results_dir()
```

**Value**

Character: path to the NicheNet results directory.

**Examples**

```
nichenet_results_dir()
# [1] "nichenet_results"
```

---

nichenet\_signaling\_network  
*Builds a NicheNet signaling network*

---

**Description**

Builds signaling network prior knowledge for NicheNet using multiple resources.

**Usage**

```
nichenet_signaling_network(
  omnipath = list(),
  pathwaycommons = list(),
  harmonizome = list(),
  vinayagam = list(),
  cpdb = list(),
  evex = list(),
  inbiomap = list(),
  only_omnipath = FALSE
)
```

**Arguments**

omnipath	List with paramaters to be passed to <a href="#">nichenet_signaling_network_omnipath</a> .
pathwaycommons	List with paramaters to be passed to <a href="#">nichenet_signaling_network_pathwaycommons</a> .
harmonizome	List with paramaters to be passed to <a href="#">nichenet_signaling_network_harmonizome</a> .
vinayagam	List with paramaters to be passed to <a href="#">nichenet_signaling_network_vinayagam</a> .
cpdb	List with paramaters to be passed to <a href="#">nichenet_signaling_network_cpdb</a> .
evex	List with paramaters to be passed to <a href="#">nichenet_signaling_network_evex</a> .
inbiomap	List with paramaters to be passed to <a href="#">nichenet_signaling_network_inbiomap</a> .
only_omnipath	Logical: a shortcut to use only OmniPath as network resource.

**Value**

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

**See Also**

- [nichenet\\_signaling\\_network\\_omnipath](#)
- [nichenet\\_signaling\\_network\\_pathwaycommons](#)
- [nichenet\\_signaling\\_network\\_harmonizome](#)
- [nichenet\\_signaling\\_network\\_vinayagam](#)
- [nichenet\\_signaling\\_network\\_cpdb](#)
- [nichenet\\_signaling\\_network\\_evex](#)
- [nichenet\\_signaling\\_network\\_inbiomap](#)

**Examples**

```
# load everything with the default parameters:
# we don't load inBio Map due to the - hopefully
# temporary - issues of their server
sig_network <- nichenet_signaling_network(inbiomap = NULL, cpdb = NULL)

# override parameters for some resources:
sig_network <- nichenet_signaling_network(
  omnipath = list(resources = c('SIGNOR', 'Signalink3', 'SPIKE')),
  pathwaycommons = NULL,
  harmonizome = list(datasets = c('phosphositeplus', 'depod')),
  # we can not include this in everyday tests as it takes too long:
  # cpdb = list(complex_max_size = 1, min_score = .98),
  cpdb = NULL,
  evex = list(min_confidence = 1.5),
  inbiomap = NULL
)

# use only OmniPath:
sig_network_omnipath <- nichenet_signaling_network(only_omnipath = TRUE)
```

---

`nichenet_signaling_network_cpdb`*Builds signaling network for NicheNet using ConsensusPathDB*

---

## Description

Builds signaling network prior knowledge using ConsensusPathDB (CPDB) data. Note, the interactions from CPDB are not directed and many of them comes from complex expansion. Find out more at <http://cpdb.molgen.mpg.de/>.

## Usage

```
nichenet_signaling_network_cpdb(...)
```

## Arguments

... Passed to [consensuspathdb\\_download](#).

## Value

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

## See Also

- [nichenet\\_signaling\\_network](#)
- [consensuspathdb\\_download](#)

## Examples

```
## Not run:  
# use some parameters stricter than default:  
cpdb_signaling_network <- nichenet_signaling_network_cpdb(  
  complex_max_size = 2,  
  min_score = .99  
)  
  
## End(Not run)
```

---

`nichenet_signaling_network_evex`*NicheNet signaling network from EVEX*

---

**Description**

Builds signaling network prior knowledge for NicheNet from the EVEX database.

**Usage**

```
nichenet_signaling_network_evex(top_confidence = 0.75, indirect = FALSE, ...)
```

**Arguments**

<code>top_confidence</code>	Double, between 0 and 1. Threshold based on the quantile of the confidence score.
<code>indirect</code>	Logical: whether to include indirect interactions.
<code>...</code>	Ignored.

**Value**

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

**See Also**

- [evex\\_download](#)
- [nichenet\\_signaling\\_network](#)

**Examples**

```
ev_signaling_network <- nichenet_signaling_network_evex(  
  top_confidence = .9  
)
```

---

`nichenet_signaling_network_harmonizome`*NicheNet signaling network from Harmonizome*

---

**Description**

Builds signaling network prior knowledge for NicheNet using Harmonizome



**Usage**

```
nichenet_signaling_network_harmonizome(  
  datasets = c("phosphositeplus", "kea", "depod"),  
  ...  
)
```

**Arguments**

datasets	The datasets to use. For possible values please refer to default value and the Harmonizome webpage.
...	Ignored.

**Value**

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

**Examples**

```
# use only KEA and PhosphoSite:  
hz_signaling_network <- nichenet_signaling_network_harmonizome(  
  datasets = c('kea', 'phosphositeplus')  
)
```

---

nichenet\_signaling\_network\_inbiomap  
*NicheNet signaling network from InWeb InBioMap*

---

**Description**

Builds signaling network prior knowledge for NicheNet from the InWeb InBioMap database.

**Usage**

```
nichenet_signaling_network_inbiomap(...)
```

**Arguments**

...	Ignored.
-----	----------

**Value**

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

**See Also**

[nichenet\\_signaling\\_network](#), [inbiomap\\_download](#)

## Examples

```
ib_signaling_network <- nichenet_signaling_network_inbiomap()
```

---

nichenet\_signaling\_network\_omnipath

*Builds signaling network for NicheNet using OmniPath*

---

## Description

Retrieves network prior knowledge from OmniPath and provides it in a format suitable for NicheNet. This method never downloads the ‘ligreextra’ dataset because the ligand-receptor interactions are supposed to come from [nichenet\\_lr\\_network\\_omnipath](#).

## Usage

```
nichenet_signaling_network_omnipath(min_curation_effort = 0, ...)
```

## Arguments

min_curation_effort	Lower threshold for curation effort
...	Passed to <a href="#">import_post_translational_interactions</a>

## Value

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

## See Also

- [nichenet\\_signaling\\_network](#)

## Examples

```
# use interactions with at least 2 evidences (reference or database)
op_signaling_network <- nichenet_signaling_network_omnipath(
  min_curation_effort = 2
)
```

---

`nichenet_signaling_network_pathwaycommons`*NicheNet signaling network from PathwayCommons*

---

**Description**

Builds signaling network prior knowledge for NicheNet using PathwayCommons.

**Usage**

```
nichenet_signaling_network_pathwaycommons(  
  interaction_types = c("catalysis-precedes", "controls-phosphorylation-of",  
    "controls-state-change-of", "controls-transport-of", "in-complex-with",  
    "interacts-with"),  
  ...  
)
```

**Arguments**

`interaction_types` Character vector with PathwayCommons interaction types. Please refer to the default value and the PathwayCommons webpage.

`...` Ignored.

**Value**

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

**Examples**

```
# use only the "controls-transport-of" interactions:  
pc_signaling_network <- nichenet_signaling_network_pathwaycommons(  
  interaction_types = 'controls-transport-of'  
)
```

---

`nichenet_signaling_network_vinayagam`*NicheNet signaling network from Vinayagam*

---

**Description**

Builds signaling network prior knowledge for NicheNet using Vinayagam 2011 Supplementary Table S6. Find out more at <https://doi.org/10.1126/scisignal.2001699>.

**Usage**

```
nichenet_signaling_network_vinayagam(...)
```

**Arguments**

... Ignored.

**Value**

A network data frame (tibble) with signaling interactions suitable for use with NicheNet.

**Examples**

```
vi_signaling_network <- nichenet_signaling_network_vinayagam()
```

---

nichenet\_test

*Run the NicheNet pipeline with a little dummy network*

---

**Description**

Loads a tiny network and runs the NicheNet pipeline with low number of iterations in the optimization process. This way the pipeline runs in a reasonable time in order to test the code. Due to the random subsampling disconnected networks might be produced sometimes. If you see an error like "Error in if (sd(prediction\_vector) == 0) ... missing value where TRUE/FALSE needed", the random subsampled input is not appropriate. In this case just interrupt and call again. This test ensures the computational integrity of the pipeline. If it fails during the optimization process, try to start it over several times, even restarting R. The unpredictability is related to codemlrMBO and nichenetr not being prepared to handle certain conditions, and it's also difficult to find out which conditions lead to which errors. At least 3 different errors appear time to time, depending on the input. It also seems like restarting R sometimes helps, suggesting that the entire system might be somehow stateful. You can ignore the Parallelization was not stopped warnings on repeated runs.

**Usage**

```
nichenet_test(...)
```

**Arguments**

... Passed to [nichenet\\_main](#).

**Value**

A named list with the intermediate and final outputs of the pipeline: 'networks', 'expression', 'optimized\_parameters', 'weighted\_networks' and 'ligand\_target\_matrix'.

**Examples**

```
nnt <- nichenet_test()
```

---

nichenet\_workarounds     *Workarounds using NicheNet without attaching the package*

---

**Description**

NicheNet requires the availability of some lazy loaded external data which are not available if the package is not loaded and attached. Also, the `BBmisc::convertToShortString` used for error reporting in `mlrMBO::evalTargetFun.OptState` is patched here to print longer error messages. Maybe it's a better solution to attach `nichenetr` before running the NicheNet pipeline. Alternatively you can try to call this function in the beginning. Why we don't call this automatically is just because we don't want to load datasets from another package without the user knowing about it.

**Usage**

```
nichenet_workarounds()
```

**Value**

Returns NULL.

**Examples**

```
nichenet_workarounds()
```

---

obo\_parser                     *Generic OBO parser*

---

**Description**

Reads the contents of an OBO file and processes it into data frames or a list based data structure.

**Usage**

```
obo_parser(  
  path,  
  relations = c("is_a", "part_of", "occurs_in", "regulates", "positively_regulates",  
               "negatively_regulates"),  
  shorten_namespace = TRUE,  
  tables = TRUE  
)
```

**Arguments**

path	Path to the OBO file.
relations	Character vector: process only these relations.
shorten_namespace	Logical: shorten the namespace to a single letter code (as usual for Gene Ontology, e.g. cellular_component = "C").
tables	Logical: return data frames (tibbles) instead of nested lists.

**Value**

A list with the following elements: 1) "names" a list with terms as names and names as values; 2) "namespaces" a list with terms as names and namespaces as values; 3) "relations" a list with relations between terms: terms are keys, values are lists with relations as names and character vectors of related terms as values; 4) "subsets" a list with terms as keys and character vectors of subset names as values (or NULL if the term does not belong to any subset); 5) "obsolete" character vector with all the terms labeled as obsolete. If the tables parameter is TRUE, "names", "namespaces", "relations" and "subsets" will be data frames (tibbles).

**See Also**

- [relations\\_list\\_to\\_table](#)
- [relations\\_table\\_to\\_list](#)
- [swap\\_relations](#)

**Examples**

```
goslim_url <-
  "http://current.geneontology.org/ontology/subsets/goslim_generic.obo"
path <- tempfile()
httr::GET(goslim_url, httr::write_disk(path, overwrite = TRUE))
obo <- obo_parser(path, tables = FALSE)
unlink(path)
names(obo)
# [1] "names"      "namespaces" "relations"  "subsets"    "obsolete"
head(obo$relations, n = 2)
# $`GO:0000001`
# $`GO:0000001`$is_a
# [1] "GO:0048308" "GO:0048311"
#
# $`GO:0000002`
# $`GO:0000002`$is_a
# [1] "GO:0007005"
```

## Description

OmnipathR is an R package built to provide easy access to the data stored in the OmniPath web service:

<https://omnipathdb.org/>

And a number of other resources, such as BioPlex, ConsensusPathDB, EVEX, Guide to Pharmacology (IUPHAR/BPS), Harmonizome, HTRIdb, InWeb InBioMap, KEGG Pathway, Pathway Commons, Ramilowski et al. 2015, RegNetwork, ReMap, TF census, TRRUST and Vinayagam et al. 2011.

The OmniPath web service implements a very simple REST style API. This package make requests by the HTTP protocol to retrieve the data. Hence, fast Internet access is required for a proper use of OmnipathR.

The package also provides some utility functions to filter, analyse and visualize the data. Furthermore, OmnipathR features a close integration with the NicheNet method for ligand activity prediction from transcriptomics data, and its R implementation nichenetr (available in CRAN).

## Author(s)

Alberto Valdeolivas <<alvaldeolivas@gmail>> and Denes Turei <<turei.denes@gmail.com>> and Attila Gabor <<gaborattila87@gmail.com>>

## Examples

```
# Download post-translational modifications:
enzsub <- import_omnipath_enzsub(resources = c("PhosphoSite", "SIGNOR"))

# Download protein-protein interactions
interactions <- import_omnipath_interactions(resources = c("SignalLink3"))

# Convert to igraph objects:
enzsub_g <- enzsub_graph(enzsub = enzsub)
OPI_g <- interaction_graph(interactions = interactions )

# Print some interactions:
print_interactions(head(ptms))

# interactions with references:
print_interactions(tail(ptms),writeRefs=TRUE)

# find interactions between kinase and substrate:
print_interactions(dplyr::filter(ptms,enzyme_genesymbol=="MAP2K1",
  substrate_genesymbol=="MAPK3"))

# find shortest paths on the directed network between proteins
```

```

print_path_es(shortest_paths(OPI_g, from = "TYR03", to = "STAT3",
  output = 'epath')$epath[[1]], OPI_g)

# find all shortest paths between proteins
print_path_vs(
  all_shortest_paths(
    enzsub_g,
    from = "SRC",
    to = "STAT1"
  )$res,
  enzsub_g
)

```

---

omnipath\_cache\_autoclean

*Keeps only the latest versions of complete downloads*

---

### Description

Removes the old versions, the failed downloads and the files in the cache directory which are missing from the database. For more flexible operations use [omnipath\\_cache\\_remove](#) and [omnipath\\_cache\\_clean](#).

### Usage

```
omnipath_cache_autoclean()
```

### Value

Invisibl returns the cache database (list of cache records).

### Examples

```
omnipath_cache_autoclean()
```

---

omnipath\_cache\_clean *Removes the items from the cache directory which are unknown by the cache database*

---

### Description

Removes the items from the cache directory which are unknown by the cache database



**Usage**

```
omnipath_cache_clean()
```

**Value**

Returns 'NULL'.

**Examples**

```
omnipath_cache_clean()
```

---

omnipath\_cache\_clean\_db

*Removes the cache database entries without existing files*

---

**Description**

Removes the cache database entries without existing files

**Usage**

```
omnipath_cache_clean_db(...)
```

**Arguments**

... Ignored.

**Value**

Returns 'NULL'.

**Examples**

```
omnipath_cache_clean_db()
```

---

`omnipath_cache_download_ready`*Sets the download status to ready for a cache item*

---

**Description**

Sets the download status to ready for a cache item

**Usage**

```
omnipath_cache_download_ready(version, key = NULL)
```

**Arguments**

<code>version</code>	Version of the cache item. If does not exist a new version item will be created
<code>key</code>	Key of the cache item

**Value**

Character: invisibly returns the version number of the cache version item.

**Examples**

```
bioc_url <- 'https://bioconductor.org/'
# request a new version item (or retrieve the latest)
new_version <- omnipath_cache_latest_or_new(url = bioc_url)
# check if the version item is not a finished download
new_version$status
# [1] "unknown"
# download the file
httr::GET(bioc_url, httr::write_disk(new_version$path, overwrite = TRUE))
# report to the cache database that the download is ready
omnipath_cache_download_ready(new_version)
# now the status is ready:
version <- omnipath_cache_latest_or_new(url = bioc_url)
version$status
# "ready"
version$dl_finished
# [1] "2021-03-09 16:48:38 CET"
omnipath_cache_remove(url = bioc_url) # cleaning up
```

---

`omnipath_cache_filter_versions`*Filters the versions from one cache record*

---

### Description

Filters the versions based on multiple conditions: their age and status

### Usage

```
omnipath_cache_filter_versions(  
  record,  
  latest = FALSE,  
  max_age = NULL,  
  min_age = NULL,  
  status = CACHE_STATUS$READY  
)
```

### Arguments

<code>record</code>	A cache record
<code>latest</code>	Return the most recent version
<code>max_age</code>	The maximum age in days (e.g. 5: 5 days old or more recent)
<code>min_age</code>	The minimum age in days (e.g. 5: 5 days old or older)
<code>status</code>	Character vector with status codes. By default only the versions with 'ready' (completed download) status are selected

### Value

Character vector with version IDs, NA if no version satisfies the conditions.

### Examples

```
# creating an example cache record  
bioc_url <- 'https://bioconductor.org/'  
version <- omnipath_cache_latest_or_new(url = bioc_url)  
httr::GET(bioc_url, httr::write_disk(version$path, overwrite = TRUE))  
omnipath_cache_download_ready(version)  
record <- dplyr::first(omnipath_cache_search('biocond'))  
  
# only the versions with status "ready"  
version_numbers <- omnipath_cache_filter_versions(record, status = 'ready')  
omnipath_cache_remove(url = bioc_url) # cleaning up
```

---

omnipath\_cache\_get      *Retrieves one item from the cache directory*

---

### Description

Retrieves one item from the cache directory

### Usage

```
omnipath_cache_get(
  key = NULL,
  url = NULL,
  post = NULL,
  payload = NULL,
  create = TRUE,
  ...
)
```

### Arguments

key	The key of the cache record
url	URL pointing to the resource
post	HTTP POST parameters as a list
payload	HTTP data payload
create	Create a new entry if doesn't exist yet
...	Passed to omnipath_cache_record (internal function)

### Value

Cache record: an existing record if the entry already exists, otherwise a newly created and inserted record

### Examples

```
# create an example cache record
bioc_url <- 'https://bioconductor.org/'
version <- omnipath_cache_latest_or_new(url = bioc_url)
omnipath_cache_remove(url = bioc_url) # cleaning up

# retrieve the cache record
record <- omnipath_cache_get(url = bioc_url)
record$key
# [1] "41346a00fb20d2a9df03aa70cf4d50bf88ab154a"
record$url
# [1] "https://bioconductor.org/"
```

---

omnipath\_cache\_key      *Generates a hash which identifies an element in the cache database*

---

### Description

Generates a hash which identifies an element in the cache database

### Usage

```
omnipath_cache_key(url, post = NULL, payload = NULL)
```

### Arguments

url	Character vector with URLs
post	List with the HTTP POST parameters or a list of lists if the url vector is longer than 1. NULL for queries without POST parameters.
payload	HTTP data payload. List with multiple items if the url vector is longer than 1. NULL for queries without data.

### Value

Character vector of cache record keys.

### Examples

```
bioc_url <- 'https://bioconductor.org/'
omnipath_cache_key(bioc_url)
# [1] "41346a00fb20d2a9df03aa70cf4d50bf88ab154a"
```

---

omnipath\_cache\_latest\_or\_new  
*The latest or a new version of a cache record*

---

### Description

Looks up a record in the cache and returns its latest valid version. If the record doesn't exist or no valid version available, creates a new one.

**Usage**

```
omnipath_cache_latest_or_new(
  key = NULL,
  url = NULL,
  post = NULL,
  payload = NULL,
  create = TRUE,
  ...
)
```

**Arguments**

key	The key of the cache record
url	URL pointing to the resource
post	HTTP POST parameters as a list
payload	HTTP data payload
create	Logical: whether to create and return a new version. If FALSE only the latest existing valid version is returned, if available.
...	Passed to <a href="#">omnipath_cache_get</a>

**Value**

A cache version item.

**Examples**

```
# retrieve the latest version of the first cache record
# found by the search keyword "bioplex"
latest_bioplex <-
  omnipath_cache_latest_or_new(
    names(omnipath_cache_search('bioplex'))[1]
  )

latest_bioplex$dl_finished
# [1] "2021-03-09 14:28:50 CET"
latest_bioplex$path
# [1] "/home/denes/.cache/OmnipathR/378e0def2ac97985f629-1.rds"

# create an example cache record
bioc_url <- 'https://bioconductor.org/'
version <- omnipath_cache_latest_or_new(url = bioc_url)
omnipath_cache_remove(url = bioc_url) # cleaning up
```

---

`omnipath_cache_latest_version`*Finds the most recent version in a cache record*

---

**Description**

Finds the most recent version in a cache record

**Usage**

```
omnipath_cache_latest_version(record)
```

**Arguments**

`record`            A cache record

**Value**

Character: the version ID with the most recent download finished time

---

`omnipath_cache_load`    *Loads an R object from the cache*

---

**Description**

Loads the object from RDS format.

**Usage**

```
omnipath_cache_load(  
  key = NULL,  
  version = NULL,  
  url = NULL,  
  post = NULL,  
  payload = NULL  
)
```

**Arguments**

`key`            Key of the cache item

`version`        Version of the cache item. If does not exist or NULL, the latest version will be retrieved

`url`            URL of the downloaded resource

`post`           HTTP POST parameters as a list

`payload`        HTTP data payload

**Value**

Object loaded from the cache RDS file.

**See Also**

[omnipath\\_cache\\_save](#)

**Examples**

```
url <- paste0(
  'https://omnipathdb.org/intercell?resources=Adhesome,Almen2009,',
  'Baccin2019,CSPA,CellChatDB&license=academic'
)
result <- read.delim(url, sep = '\t')
omnipath_cache_save(result, url = url)
# works only if you have already this item in the cache
intercell_data <- omnipath_cache_load(url = url)
class(intercell_data)
# [1] "data.frame"
nrow(intercell_data)
# [1] 16622
attr(intercell_data, 'origin')
# [1] "cache"

# basic example of saving and loading to and from the cache:
bioc_url <- 'https://bioconductor.org/'
bioc_html <- readChar(url(bioc_url), nchars = 99999)
omnipath_cache_save(bioc_html, url = bioc_url)
bioc_html <- omnipath_cache_load(url = bioc_url)
```

---

omnipath\_cache\_move\_in

*Moves an existing file into the cache*

---

**Description**

Either the key or the URL (with POST and payload) must be provided.

**Usage**

```
omnipath_cache_move_in(
  path,
  key = NULL,
  version = NULL,
  url = NULL,
  post = NULL,
  payload = NULL,
  keep_original = FALSE
)
```



**Arguments**

path	Path to the source file
key	Key of the cache item
version	Version of the cache item. If does not exist a new version item will be created
url	URL of the downloaded resource
post	HTTP POST parameters as a list
payload	HTTP data payload
keep_original	Whether to keep or remove the original file

**Value**

Character: invisibly returns the version number of the cache version item.

**See Also**

[omnipath\\_cache\\_save](#)

**Examples**

```
path <- tempfile()
saveRDS(rnorm(100), file = path)
omnipath_cache_move_in(path, url = 'the_download_address')

# basic example of moving a file to the cache:

bioc_url <- 'https://bioconductor.org/'
html_file <- tempfile(fileext = '.html')
httr::GET(bioc_url, httr::write_disk(html_file, overwrite = TRUE))
omnipath_cache_move_in(path = html_file, url = bioc_url)
omnipath_cache_remove(url = bioc_url) # cleaning up
```

---

omnipath\_cache\_remove *Removes contents from the cache directory*

---

**Description**

According to the parameters, it can remove contents older than a certain age, or contents having a more recent version, one specific item, or wipe the entire cache.

**Usage**

```
omnipath_cache_remove(key = NULL, url = NULL, post = NULL,
  payload = NULL, max_age = NULL, min_age = NULL, status = NULL,
  only_latest = FALSE, wipe = FALSE, autoclean = TRUE)
```

**Arguments**

key	The key of the cache record
url	URL pointing to the resource
post	HTTP POST parameters as a list
payload	HTTP data payload
max_age	Age of cache items in days. Remove everything that is older than this age
min_age	Age of cache items in days. Remove everything more recent than this age
status	Remove items having any of the states listed here
only_latest	Keep only the latest version
wipe	Logical: if TRUE, removes all files from the cache and the cache database. Same as calling <a href="#">omnipath_cache_wipe</a> .
autoclean	Remove the entries about failed downloads, the files in the cache directory which are missing from the cache database, and the entries without existing files in the cache directory

**Value**

Invisibly returns the cache database (list of cache records).

**See Also**

- [omnipath\\_cache\\_wipe](#)
- [omnipath\\_cache\\_clean](#)
- [omnipath\\_cache\\_autoclean](#)

**Examples**

```
# remove all cache data from the BioPlex database
cache_records <- omnipath_cache_search(
  'bioplex',
  ignore.case = TRUE
)
omnipath_cache_remove(names(cache_records))

# remove a record by its URL
regnetwork_url <- 'http://www.regnetworkweb.org/download/human.zip'
omnipath_cache_remove(url = regnetwork_url)

# remove all records older than 30 days
omnipath_cache_remove(max_age = 30)

# for each record, remove all versions except the latest
omnipath_cache_remove(only_latest = TRUE)

bioc_url <- 'https://bioconductor.org/'
version <- omnipath_cache_latest_or_new(url = bioc_url)
```

```
httr::GET(bioc_url, httr::write_disk(version$path, overwrite = TRUE))
omnipath_cache_download_ready(version)
key <- omnipath_cache_key(bioc_url)
omnipath_cache_remove(key = key)
```

---

omnipath\_cache\_save    *Saves an R object to the cache*

---

### Description

Exports the object in RDS format, creates new cache record if necessary.

### Usage

```
omnipath_cache_save(  
  data,  
  key = NULL,  
  version = NULL,  
  url = NULL,  
  post = NULL,  
  payload = NULL  
)
```

### Arguments

data	An object
key	Key of the cache item
version	Version of the cache item. If does not exist a new version item will be created
url	URL of the downloaded resource
post	HTTP POST parameters as a list
payload	HTTP data payload

### Value

Returns invisibly the data itself.

Invisibly returns the 'data'.

### See Also

[omnipath\\_cache\\_move\\_in](#)

## Examples

```
mydata <- data.frame(a = c(1, 2, 3), b = c('a', 'b', 'c'))
omnipath_cache_save(mydata, url = 'some_dummy_address')
from_cache <- omnipath_cache_load(url = 'some_dummy_address')
from_cache
#   a b
# 1 1 a
# 2 2 b
# 3 3 c
attr(from_cache, 'origin')
# [1] "cache"

# basic example of saving and loading to and from the cache:
bioc_url <- 'https://bioconductor.org/'
bioc_html <- readChar(url(bioc_url), nchars = 99999)
omnipath_cache_save(bioc_html, url = bioc_url)
bioc_html <- omnipath_cache_load(url = bioc_url)
```

---

omnipath\_cache\_search *Searches for cache items*

---

## Description

Searches the cache records by matching the URL against a string or regexp.

## Usage

```
omnipath_cache_search(pattern, ...)
```

## Arguments

pattern	String or regular expression.
...	Passed to grep

## Value

List of cache records matching the pattern.

## Examples

```
# find all cache records from the BioPlex database
bioplex_cache_records <- omnipath_cache_search(
  'bioplex',
  ignore.case = TRUE
)
```

---

`omnipath_cache_set_ext`*Sets the file extension for a cache record*

---

**Description**

Sets the file extension for a cache record

**Usage**

```
omnipath_cache_set_ext(key, ext)
```

**Arguments**

<code>key</code>	Character: key for a cache item, alternatively a version entry.
<code>ext</code>	Character: the file extension, e.g. "zip".

**Value**

Returns 'NULL'.

**Examples**

```
bioc_url <- 'https://bioconductor.org/'
version <- omnipath_cache_latest_or_new(url = bioc_url)
version$path
# [1] "/home/denes/.cache/OmnipathR/41346a00fb20d2a9df03-1"
httr::GET(bioc_url, httr::write_disk(version$path, overwrite = TRUE))
key <- omnipath_cache_key(url = bioc_url)
omnipath_cache_set_ext(key = key, ext = 'html')
version <- omnipath_cache_latest_or_new(url = bioc_url)
version$path
# [1] "/home/denes/.cache/OmnipathR/41346a00fb20d2a9df03-1.html"
record <- omnipath_cache_get(url = bioc_url)
record$ext
# [1] "html"
omnipath_cache_remove(url = bioc_url) # cleaning up
```

---

`omnipath_cache_update_status`*Updates the status of an existing cache record*

---

**Description**

Updates the status of an existing cache record

**Usage**

```
omnipath_cache_update_status(key, version, status,  
                             dl_finished = NULL)
```

**Arguments**

<code>key</code>	Key of the cache item
<code>version</code>	Version of the cache item. If does not exist a new version item will be created
<code>status</code>	The updated status value
<code>dl_finished</code>	Timestamp for the time when download was finished, if 'NULL' the value remains unchanged

**Value**

Character: invisibly returns the version number of the cache version item.

**Examples**

```
bioc_url <- 'https://bioconductor.org/'  
latest_version <- omnipath_cache_latest_or_new(url = bioc_url)  
key <- omnipath_cache_key(bioc_url)  
omnipath_cache_update_status(  
  key = key,  
  version = latest_version$number,  
  status = 'ready',  
  dl_finished = Sys.time()  
)  
omnipath_cache_remove(url = bioc_url) # cleaning up
```

---

omnipath\_cache\_wipe     *Permanently removes all the cache contents*

---

**Description**

After this operation the cache directory will be completely empty, except an empty cache database file.

**Usage**

```
omnipath_cache_wipe(...)
```

**Arguments**

...                    Ignored.

**Value**

Returns 'NULL'.

**See Also**

[omnipath\\_cache\\_remove](#)

**Examples**

```
omnipath_cache_wipe()
# the cache is completely empty:
print(omnipath.env$cache)
# list()
list.files(omnipath_get_cachedir())
# [1] "cache.json"
```

---

omnipath\_get\_config\_path  
                          *Current config file path*

---

**Description**

Current config file path

**Usage**

```
omnipath_get_config_path(user = FALSE)
```

**Arguments**

user                    Logical: prioritize the user level config even if a config in the current working directory is available.

**Value**

Character: path to the config file.

**Examples**

```
omnipath_get_config_path()
```

---

omnipath\_load\_config    *Load the package configuration from a config file*

---

**Description**

Load the package configuration from a config file

**Usage**

```
omnipath_load_config(path = NULL, title = "default", user = FALSE, ...)
```

**Arguments**

path                    Path to the config file.

title                    Load the config under this title. One config file might contain multiple configurations, each identified by a title. If the title is not available the first section of the config file will be used.

user                    Force to use the user level config even if a config file exists in the current directory. By default, the local config files have priority over the user level config.

...                     Passed to `yaml::yaml.load_file`.

**Value**

Invisibly returns the config as a list.

**Examples**

```
# load the config from a custom config file:
omnipath_load_config(path = 'my_custom_omnipath_config.yml')
```



---

omnipath_log	<i>Browse the current OmnipathR log file</i>
--------------	--

---

**Description**

Browse the current OmnipathR log file

**Usage**

```
omnipath_log()
```

**Value**

Returns 'NULL'.

**See Also**

[omnipath\\_logfile](#)

**Examples**

```
omnipath_log()
# then you can browse the log file, and exit with `q`
```

---

omnipath_logfile	<i>Path to the current OmnipathR log file</i>
------------------	---

---

**Description**

Path to the current OmnipathR log file

**Usage**

```
omnipath_logfile()
```

**Value**

Character: path to the current logfile, or NULL if no logfile is available.

**See Also**

[omnipath\\_log](#)

## Examples

```
omnipath_logfile()
# [1] "/home/denes/omnipathr/omnipathr-log/omnipathr-20210309-1642.log"
```

---

omnipath\_msg

*Dispatch a message to the OmnipathR logger*

---

## Description

Any package or script can easily send log messages and establish a logging facility with the fantastic ‘logger’ package. This function serves the only purpose if you want to inject messages into the logger of OmnipathR. Otherwise we recommend to use the ‘logger’ package directly.

## Usage

```
omnipath_msg(level, ...)
```

## Arguments

level	Character, numeric or class loglevel. A log level, if character one of the followings: "fatal", "error", "warn", "success", "info", "trace".
...	Arguments for string formatting, passed <code>sprintf</code> or <code>str_glue</code> .

## Value

Returns ‘NULL’.

## Examples

```
omnipath_msg(
  level = 'success',
  'Talking to you in the name of OmnipathR, my favourite number is %d',
  round(runif(1, 1, 10))
)
```

---

omnipath\_reset\_config *Restores the built-in default values of all config parameters*

---

**Description**

Restores the built-in default values of all config parameters

**Usage**

```
omnipath_reset_config(save = NULL, reset_all = FALSE)
```

**Arguments**

save	If a path, the restored config will be also saved to this file. If TRUE, the config will be saved to the current default config path (see <a href="#">omnipath_get_config_path</a> ).
reset_all	Reset to their defaults also the options already set in the R options.

**Value**

The config as a list.

**See Also**

[omnipath\\_load\\_config](#), [omnipath\\_save\\_config](#)

**Examples**

```
# restore the defaults and write them to the default config file:
omnipath_reset_config()
omnipath_save_config()
```

---

omnipath\_save\_config *Save the current package configuration*

---

**Description**

Save the current package configuration

**Usage**

```
omnipath_save_config(path = NULL, title = "default", local = FALSE)
```

**Arguments**

path	Path to the config file. Directories and the file will be created if don't exist.
title	Save the config under this title. One config file might contain multiple configurations, each identified by a title.
local	Save into a config file in the current directory instead of a user level config file. When loading, the config in the current directory has priority over the user level config.

**Value**

Returns 'NULL'.

**Examples**

```
# after this, all downloads will default to commercial licenses
# i.e. the resources that allow only academic use will be excluded:
options(omnipath.license = 'commercial')
omnipath_save_config()
```

---

omnipath\_set\_cachedir *Change the cache directory*

---

**Description**

Change the cache directory

**Usage**

```
omnipath_set_cachedir(path = NULL)
```

**Arguments**

path	Character: path to the new cache directory. If don't exist, the directories will be created. If the path is an existing cache directory, the package's cache database for the current session will be loaded from the database in the directory. If NULL, the cache directory will be set to its default path.
------	--

**Value**

Returns NULL.

**Examples**

```
tmp_cache <- tempdir()
omnipath_set_cachedir(tmp_cache)
# restore the default cache directory:
omnipath_set_cachedir()
```

---

omnipath\_set\_console\_loglevel  
*Sets the log level for the console*

---

**Description**

Use this method to change during a session which messages you want to be printed on the console. Before loading the package, you can set it also by the config file, with the `omnipath.console_loglevel` key.

**Usage**

```
omnipath_set_console_loglevel(level)
```

**Arguments**

`level`                   Character or class 'loglevel'. The desired log level.

**Value**

Returns 'NULL'.

**See Also**

[omnipath\\_set\\_logfile\\_loglevel](#)

**Examples**

```
omnipath_set_console_loglevel('warn')
# or:
omnipath_set_console_loglevel(logger::WARN)
```



**Value**

Returns 'NULL'.

**Examples**

```
omnipath_set_loglevel(logger::FATAL, target = 'console')
```

---

omnipath_show_db	<i>Built in database definitions</i>
------------------	--------------------------------------

---

**Description**

Databases are resources which might be costly to load but can be used many times by functions which usually automatically load and retrieve them from the database manager. Each database has a lifetime and will be unloaded automatically upon expiry.

**Usage**

```
omnipath_show_db()
```

**Value**

A data frame with the built in database definitions.

**Examples**

```
database_definitions <- omnipath_show_db()
database_definitions
# # A tibble: 14 x 10
#   name      last_used      lifetime package loader loader_p.
#   <chr>    <dtm>          <dbl> <chr> <chr> <list>
# 1 Gene Onto. 2021-04-04 20:19:15    300 Omnipat. go_ontol. <named l.
# 2 Gene Onto. NA                300 Omnipat. go_ontol. <named l.
# 3 Gene Onto. NA                300 Omnipat. go_ontol. <named l.
# 4 Gene Onto. NA                300 Omnipat. go_ontol. <named l.
# 5 Gene Onto. NA                300 Omnipat. go_ontol. <named l.
# ... (truncated)
# # . with 4 more variables: latest_param <list>, loaded <lgl>, db <list>,
# #   key <chr>
```

---

omnipath\_unlock\_cache\_db

*Removes the lock file from the cache directory*

---

### Description

A lock file in the cache directory avoids simultaneous write and read. It's supposed to be removed after each read and write operation. This might not happen if the process crashes during such an operation. In this case you can manually call this function.

### Usage

```
omnipath_unlock_cache_db()
```

### Value

Logical: returns TRUE if the cache was locked and now is unlocked; FALSE if it was not locked.

### Examples

```
omnipath_unlock_cache_db()
```

---

ontology\_ensure\_id     *Only ontology IDs*

---

### Description

Converts a mixture of ontology IDs and names to only IDs. If an element of the input is missing from the chosen ontology it will be dropped. This can happen if the ontology is a subset (slim) version, but also if the input is not a valid ID or name.

### Usage

```
ontology_ensure_id(terms, db_key = "go_basic")
```

### Arguments

terms	Character: ontology IDs or term names.
db_key	Character: key to identify the ontology database. For the available keys see <a href="#">omnipath_show_db</a> .

### Value

Character vector of ontology IDs.



**Examples**

```
ontology_ensure_id(c('mitochondrion inheritance', 'GO:0001754'))
# [1] "GO:0000001" "GO:0001754"
```

---

ontology\_ensure\_name    *Only ontology term names*

---

**Description**

Converts a mixture of ontology IDs and names to only names. If an element of the input is missing from the chosen ontology it will be dropped. This can happen if the ontology is a subset (slim) version, but also if the input is not a valid ID or name.

**Usage**

```
ontology_ensure_name(terms, db_key = "go_basic")
```

**Arguments**

terms                    Character: ontology IDs or term names.

db\_key                    Character: key to identify the ontology database. For the available keys see [omnipath\\_show\\_db](#).

**Value**

Character vector of ontology term names.

**Examples**

```
ontology_ensure_name(c('reproduction', 'GO:0001754', 'foo bar'))
# [1] "eye photoreceptor cell differentiation" "reproduction"
```

---

ontology\_name\_id        *Translate between ontology IDs and names*

---

**Description**

Makes sure that the output contains only valid IDs or term names. The input can be a mixture of IDs and names. The order of the input won't be preserved in the output.

**Usage**

```
ontology_name_id(terms, ids = TRUE, db_key = "go_basic")
```

**Arguments**

terms            Character: ontology IDs or term names.  
 ids              Logical: the output should contain IDs or term names.  
 db\_key          Character: key to identify the ontology database. For the available keys see [omnipath\\_show\\_db](#).

**Value**

Character vector of ontology IDs or term names.

**Examples**

```
ontology_name_id(c('mitochondrion inheritance', 'reproduction'))
# [1] "GO:0000001" "GO:0000003"
ontology_name_id(c('GO:0000001', 'reproduction'), ids = FALSE)
# [1] "mitochondrion inheritance" "reproduction"
```

---

pathwaycommons\_download

*Interactions from PathwayCommons*

---

**Description**

PathwayCommons (<http://www.pathwaycommons.org/>) provides molecular interactions from a number of databases, in either BioPAX or SIF (simple interaction format). This function retrieves all interactions in SIF format. The data is limited to the interacting pair and the type of the interaction.

**Usage**

```
pathwaycommons_download()
```

**Value**

A data frame (tibble) with interactions.

**Examples**

```
pc_interactions <- pathwaycommons_download()
pc_interactions
# # A tibble: 1,884,849 x 3
#   from type to
#   <chr> <chr> <chr>
# 1 A1BG controls-expression-of A2M
# 2 A1BG interacts-with ABCC6
# 3 A1BG interacts-with ACE2
# 4 A1BG interacts-with ADAM10
# 5 A1BG interacts-with ADAM17
```

```
# # . with 1,884,839 more rows
```

---

```
pivot_annotatations      Converts annotation tables to a wide format
```

---

## Description

Use this method to reconstitute the annotation tables into the format of the original resources. With the 'wide=TRUE' option `import_omnipath_annotatations` applies this function to the downloaded data.

## Usage

```
pivot_annotatations(annotatations)
```

## Arguments

`annotatations` A data frame of annotations downloaded from the OmniPath web service by `import_omnipath_annotatations`.

## Value

A wide format data frame (tibble) if the provided data contains annotations from one resource, otherwise a list of wide format tibbles.

## See Also

[import\\_omnipath\\_annotatations](#)

## Examples

```
# single resource: the result is a data frame
disgenet <- import_omnipath_annotatations(resources = 'DisGeNet')
disgenet <- pivot_annotatations(disgenet)
disgenet
# # A tibble: 126,588 × 11
#   uniprot genesymbol entity_type disease      type score  dsi  dpi
#   <chr>   <chr>      <chr>    <chr>      <chr> <dbl> <dbl> <dbl>
# 1 P04217 A1BG      protein  Schizophren. dise.  0.3  0.7  0.538
# 2 P04217 A1BG      protein  Hepatomegaly phen.  0.3  0.7  0.538
# 3 P01023 A2M      protein  Fibrosis, L. dise.  0.3  0.529 0.769
# 4 P01023 A2M      protein  Acute kidne. dise.  0.3  0.529 0.769
# 5 P01023 A2M      protein  Mental Depr. dise.  0.3  0.529 0.769
# # . with 126,583 more rows, and 3 more variables: nof_pmids <dbl>,
# #   nof_snps <dbl>, source <chr>

# multiple resources: the result is a list
annotatations <- import_omnipath_annotatations(
```

```

resources = c('DisGeNet', 'Signalink_function', 'DGIdb', 'kinase.com')
)
annotations <- pivot_annotations(annotations)
names(annotations)
# [1] "DGIdb"           "DisGeNet"       "kinase.com"
# [4] "Signalink_function"
annotations$kinase.com
## # A tibble: 825 x 6
#   uniprot genesymbol entity_type group family subfamily
#   <chr>   <chr>       <chr>   <chr> <chr> <chr>
# 1 P31749 AKT1       protein AGC   Akt   NA
# 2 P31751 AKT2       protein AGC   Akt   NA
# 3 Q9Y243 AKT3       protein AGC   Akt   NA
# 4 O14578 CIT        protein AGC   DMPK  CRIK
# 5 Q09013 DMPK       protein AGC   DMPK  GEK
## # . with 815 more rows

```

preppi\_download

*Interactions from PrePPI***Description**

Retrieves predicted protein-protein interactions from the PrePPI database (<http://honig.c2b2.columbia.edu/preppi>). The interactions in this table are supposed to be correct with a > 0.5 probability.

**Usage**

```
preppi_download(...)
```

**Arguments**

... Minimum values for the scores. The available scores are: str, protpep, str\_max, red, ort, phy, coexp, go, total, exp and final. Furthermore, an operator can be passed, either .op = '&' or .op = '|', which is then used for combined filtering by multiple scores.

**Details**

PrePPI is a combination of many prediction methods, each resulting a score. For an explanation of the scores see <https://honiglab.c2b2.columbia.edu/hfpd/help/Manual.html>. The minimum, median and maximum values of the scores:

Score	Minimum	Median	Maximum
str	0	5.5	6,495
protpep	0	3.53	38,138
str_max	0	17.9	38,138

red		0		1.25		24.4	
ort		0		0		5,000	
phy		0		2.42		2.42	
coexp		0		2.77		45.3	
go		0		5.86		181	
total		0		1,292		106,197,000,000	
exp		1		958		4,626	
final		600		1,778		4.91e14	

**Value**

A data frame (tibble) of interactions with scores, databases and literature references.

**See Also**

[preppi\\_filter](#)

**Examples**

```
preppi <- preppi_download()
preppi
## # A tibble: 1,545,710 x 15
##   prot1 prot2 str_score protpep_score str_max_score red_score ort_score
##   <chr> <chr>   <dbl>         <dbl>         <dbl>   <dbl>   <dbl>
## 1 Q131. P146.   18.6           6.45           18.6     4.25    0.615
## 2 P064. Q96N.    1.83           14.3            14.3     4.25     0
## 3 Q7Z6. Q8NC.    4.57            0                4.57     0         0
## 4 P370. P154.   485.            0                485.     1.77    0.615
## 5 O004. Q9NR.   34.0            0                34.0     0.512    0
## # . with 1,545,700 more rows, and 8 more variables: phy_score <dbl>,
## #   coexp_score <dbl>, go_score <dbl>, total_score <dbl>, dbs <chr>,
## #   pubs <chr>, exp_score <dbl>, final_score <dbl>
```

---

```
preppi_filter
```

*Filter PrePPI interactions by scores*

---

**Description**

Filter PrePPI interactions by scores

**Usage**

```
preppi_filter(data, ..., .op = "&")
```

**Arguments**

data	A data frame of PrePPI interactions as provided by <a href="#">preppi_download</a> .
...	Minimum values for the scores. The available scores are: str, protpep, str_max, red, ort, phy, coexp, go, total, exp and final. See more about the scores at <a href="#">preppi_download</a> .
.op	The operator to combine the scores with: either '&' or ' '. With the former, only records where all scores are above the threshold will be kept; with the latter, records where at least one score is above its threshold will be kept.

**Value**

The input data frame (tibble) filtered by the score thresholds.

**See Also**

[preppi\\_download](#)

**Examples**

```
preppi <- preppi_download()
preppi_filtered <- preppi_filter(preppi, red = 10, str = 4.5, ort = 1)
nrow(preppi_filtered)
# [1] 8443
```

---

print\_bma\_motif\_es      *Prints BMA motifs to the screen from a sequence of edges*

---

**Description**

The motifs can be copy-pasted into a BMA canvas.

**Usage**

```
print_bma_motif_es(edge_seq, G, granularity = 2)
```

**Arguments**

edge_seq	An igraph edge sequence.
G	An igraph graph object.
granularity	Numeric: granularity value.

**Value**

Returns 'NULL'.

**Examples**

```

interactions <- import_omnipath_interactions(resources = 'ARN')
graph <- interaction_graph(interactions)
print_bma_motif_es(igraph::E(graph)[1], graph)
# {"Model": {
#   "Name": "Omnipath motif",
#   "Variables": [{
#     "Name": "ULK1",
#     "Id": 1,
#     "RangeFrom": 0,
#     "RangeTo": 2,
#     "Formula": ""
#   }],
#   {
#     "Name": "ATG13",
#     ...
#   }],
# ... (truncated)
# }}

```

---

print\_bma\_motif\_vs      *Prints BMA motifs to the screen from a sequence of nodes*

---

**Description**

The motifs can be copy-pasted into a BMA canvas.

**Usage**

```
print_bma_motif_vs(node_seq, G)
```

**Arguments**

node\_seq      An igraph node sequence.  
G              An igraph graph object.

**Value**

Returns 'NULL'.

**Examples**

```

interactions <- import_omnipath_interactions(resources = 'ARN')
graph <- interaction_graph(interactions)
print_bma_motif_vs(
  igraph::all_shortest_paths(
    graph,
    from = 'ULK1',

```

```
        to = 'ATG13'  
    )$res,  
    graph  
  )
```

---

print\_interactions      *Print OmniPath interactions*

---

### Description

Prints the interactions or enzyme-substrate relationships in a nice format.

### Usage

```
print_interactions(interDF, writeRefs = FALSE)
```

### Arguments

interDF	data.frame with the interactions generated by any of the following functions: <ul style="list-style-type: none"><li>• <code>import_omnipath_enzsub</code></li><li>• <code>import_omnipath_interactions</code></li><li>• <code>import_pathwayextra_interactions</code></li><li>• <code>import_kinaseextra_interactions</code></li><li>• <code>import_ligrecextra_interactions</code></li><li>• <code>import_post_translational_interactions</code></li><li>• <code>import_dorothea_interactions</code></li><li>• <code>import_tf_target_interactions</code></li><li>• <code>import_transcriptional_interactions</code></li><li>• <code>import_mirnatarget_interactions</code></li><li>• <code>import_all_interactions</code></li></ul>
writeRefs	[FALSE] writes also the PubMed IDs if available

### Value

Returns 'NULL'.

### Examples

```
enzsub <- import_omnipath_enzsub()  
print_interactions(head(enzsub))  
print_interactions(tail(enzsub), writeRefs = TRUE)  
print_interactions(  
  dplyr::filter(  
    enzsub,  
    enzyme_genesymbol == 'MAP2K1',
```



```

        substrate_genesymbol == 'MAPK3'
    )
)

signor <- import_omnipath_interactions(resources = 'SIGNOR')
print_interactions(head(signor))
#           source interaction          target n_resources
# 6 MAPK14 (Q16539) ==(+)==> MAPKAPK2 (P49137)      23
# 4 TRPM7 (Q96QT4) ==(+)==> ANXA1 (P04083)      10
# 1 PRKG1 (Q13976) ==(-)==> TRPC3 (Q13507)       8
# 2 PTPN1 (P18031) ==(-)==> TRPV6 (Q9H1D0)       6
# 5 PRKACA (P17612) ==(-)==> MCOLN1 (Q9GZU1)      6
# 3 RACK1 (P63244) ==(-)==> TRPM6 (Q9BX84)       2

```

---

print\_path\_es

*Prints network paths in an edge sequence*


---

## Description

Pretty prints the interactions in a path.

## Usage

```
print_path_es(edgeSeq, G)
```

## Arguments

edgeSeq	edge sequence
G	igraph object (from ptms or any interaction dataset)

## Value

Returns 'NULL'.

## See Also

- [print\\_path\\_vs](#)

## Examples

```

interactions <- import_omnipath_interactions(resources = c('Signalink3'))
OPI_g <- interaction_graph(interactions = interactions)
print_path_es(
  suppressWarnings(igraph::shortest_paths(
    OPI_g,
    from = 'TYR03',
    to = 'STAT3',
    output = 'epath'
  ))$epath[[1]],

```

```

    OPI_g
  )

```

---

print\_path\_vs      *Print networks paths given by node sequence*

---

### Description

Prints the interactions in the path in a nice format.

### Usage

```
print_path_vs(nodeSeq, G)
```

### Arguments

nodeSeq	node sequence
G	igraph object (from ptms or interactions)

### Value

Returns 'NULL'.

### See Also

[print\\_path\\_es](#)

### Examples

```

interactions <- import_omnipath_interactions(resources=c('SignalLink3'))
OPI_g <- interaction_graph(interactions = interactions)
print_path_vs(
  igraph::all_shortest_paths(
    OPI_g,
    from = 'TYR03',
    to = 'STAT3'
  )$vpath,
  OPI_g
)
enzsub <- import_omnipath_enzsub(resources=c('PhosphoSite', 'SIGNOR'))
enzsub_g <- enzsub_graph(enzsub)
print_path_vs(
  igraph::all_shortest_paths(
    enzsub_g,
    from = 'SRC',
    to = 'STAT1'
  )$res,
  enzsub_g
)

```

---

ramilowski\_download *Downloads ligand-receptor interactions from Ramilowski et al. 2015*

---

### Description

Curated ligand-receptor pairs from Supplementary Table 2 of the article "A draft network of ligand-receptor mediated multicellular signaling in human" (<https://www.nature.com/articles/ncomms8866>).

### Usage

```
ramilowski_download()
```

### Value

A data frame (tibble) with interactions.

### Examples

```
rami_interactions <- ramilowski_download()
rami_interactions
# # A tibble: 2,557 x 16
#   Pair.Name Ligand.Approved. Ligand.Name Receptor.Approv.
#   <chr>      <chr>                <chr>      <chr>
# 1 A2M_LRP1  A2M                    alpha-2-ma. LRP1
# 2 AANAT_MT. AANAT                  aralkylami. MTNR1A
# 3 AANAT_MT. AANAT                  aralkylami. MTNR1B
# 4 ACE_AGTR2 ACE                    angiotensi. AGTR2
# 5 ACE_BDKR. ACE                    angiotensi. BDKRB2
# # . with 2,547 more rows, and 12 more variables: Receptor.Name <chr>,
# #   DLRP <chr>, HPMR <chr>, IUPHAR <chr>, HPRD <chr>,
# #   STRING.binding <chr>, STRING.experiment <chr>, HPMR.Ligand <chr>,
# #   HPMR.Receptor <chr>, PMID.Manual <chr>, Pair.Source <chr>,
# #   Pair.Evidence <chr>
```

---

regnetwork\_directions *Transcription factor effects from RegNetwork*

---

### Description

Transcription factor effects from RegNetwork

### Usage

```
regnetwork_directions(organism = "human")
```

**Arguments**

organism            Character: either human or mouse.

**Value**

A data frame (tibble) of TF-target interactions with effect signs.

**Examples**

```
reg_dir <- regnetwork_directions()
reg_dir
# # A tibble: 3,954 x 5
#   source_genesymb. source_entrez target_genesymb. target_entrez
#   <chr>             <chr>           <chr>           <chr>
# 1 AHR               196             CDKN1B          1027
# 2 APLNR             187             PIK3C3          5289
# 3 APLNR             187             PIK3R4          30849
# 4 AR                367             KLK3            354
# 5 ARNT              405             ALDOA           226
# # . with 3,944 more rows, and 1 more variable: effect <dbl>
```

---

regnetwork\_download    *Interactions from RegNetwork*

---

**Description**

Downloads transcriptional and post-transcriptional regulatory interactions from the RegNetwork database (<http://www.regnetworkweb.org/>). The information about effect signs (stimulation or inhibition), provided by [regnetwork\\_directions](#) are included in the result.

**Usage**

```
regnetwork_download(organism = "human")
```

**Arguments**

organism            Character: either human or mouse.

**Value**

Data frame with interactions.

**Examples**

```

regn_interactions <- regnetwork_download()
regn_interactions
# # A tibble: 372,778 x 7
#   source_genesymb. source_entrez target_genesymb. target_entrez
#   <chr>             <chr>             <chr>             <chr>
# 1 USF1              7391              S100A6            6277
# 2 USF1              7391              DUSP1             1843
# 3 USF1              7391              C4A               720
# 4 USF1              7391              ABCA1             19
# 5 TP53              7157              TP73              7161
# # . with 372,768 more rows, and 3 more variables: effect <dbl>,
# #   source_type <chr>, target_type <chr>

```

---

```
relations_list_to_table
```

*Table from a nested list of ontology relations*

---

**Description**

Converting the nested list to a table is a more costly operation, it takes a few seconds. Best to do it only once, or pass `tables = TRUE` to `obo_parser`, and convert the data frame to list, if you also need it in list format.

**Usage**

```
relations_list_to_table(relations, direction = NULL)
```

**Arguments**

<code>relations</code>	A nested list of ontology relations (the "relations" element of the list returned by <code>obo_parser</code> in case its argument 'tables' is FALSE).
<code>direction</code>	Override the direction (i.e. child -> parents or parent -> children). The nested lists produced by functions in the current package add an attribute "direction" thus no need to pass this value. If the attribute and the argument are both missing, the column will be named simply "side2" and it won't be clear whether the relations point from "term" to "side2" or the other way around. The direction should be a character vector of length 2 with the values "parents" and "children".

**Value**

The relations converted to a data frame (tibble).

**See Also**

- [swap\\_relations](#)
- [relations\\_table\\_to\\_list](#)
- [obo\\_parser](#)

## Examples

```
goslim_url <-  
  "http://current.geneontology.org/ontology/subsets/goslim_generic.obo"  
path <- tempfile()  
httr::GET(goslim_url, httr::write_disk(path, overwrite = TRUE))  
obo <- obo_parser(path, tables = FALSE)  
unlink(path)  
rel_tbl <- relations_list_to_table(obo$relations)
```

---

relations\_table\_to\_graph

*Graph from a table of ontology relations*

---

## Description

Graph from a table of ontology relations

## Usage

```
relations_table_to_graph(relations)
```

## Arguments

**relations**      A data frame of ontology relations (the "relations" element of the list returned by [obo\\_parser](#) in case its argument 'tables' is TRUE).

## Details

By default the relations point from child to parents, the edges in the graph will be of the same direction. Use [swap\\_relations](#) on the data frame to reverse the direction.

## Value

The relations converted to an igraph graph object.

## Examples

```
go <- get_db('go_basic')  
go_graph <- relations_table_to_graph(go$relations)
```

---

`relations_table_to_list`*Nested list from a table of ontology relations*

---

**Description**

Nested list from a table of ontology relations

**Usage**

```
relations_table_to_list(relations)
```

**Arguments**

`relations` A data frame of ontology relations (the "relations" element of the list returned by [obo\\_parser](#) in case its argument 'tables' is TRUE).

**Value**

The relations converted to a nested list.

**See Also**

- [relations\\_list\\_to\\_table](#)
- [swap\\_relations](#)
- [obo\\_parser](#)

**Examples**

```
goslim_url <-  
  "http://current.geneontology.org/ontology/subsets/goslim_generic.obo"  
path <- tempfile()  
httr::GET(goslim_url, httr::write_disk(path, overwrite = TRUE))  
obo <- obo_parser(path, tables = TRUE)  
unlink(path)  
rel_list <- relations_table_to_list(obo$relations)
```

---

`remap_dorothea_download`*Downloads TF-target interactions from ReMap*

---

## Description

ReMap (<http://remap.univ-amu.fr/>) is a database of ChIP-Seq experiments. It provides raw and merged peaks and CRMs (cis regulatory motifs) with their associations to regulators (TFs). TF-target relationships can be derived as it is written in Garcia-Alonso et al. 2019: "For ChIP-seq, we downloaded the binding peaks from ReMap and scored the interactions between each TF and each gene according to the distance between the TFBSs and the genes' transcription start sites. We evaluated different filtering strategies that consisted of selecting only the top-scoring 100, 200, 500, and 1000 target genes for each TF." (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/#s1title>). This function returns the top TF-target relationships as used in DoRothEA: [https://github.com/saezlab/dorothea/blob/master/inst/scripts/02\\_chip\\_seq.R](https://github.com/saezlab/dorothea/blob/master/inst/scripts/02_chip_seq.R)).

## Usage

```
remap_dorothea_download()
```

## Value

Data frame with TF-target relationships.

## See Also

[remap\\_tf\\_target\\_download](#)

## Examples

```
remap_interactions <- remap_dorothea_download()
remap_interactions
# # A tibble: 136,988 x 2
#   tf      target
#   <chr> <chr>
# 1 ADNP  ABCC1
# 2 ADNP  ABCC6
# 3 ADNP  ABHD5
# 4 ADNP  ABT1
# 5 ADNP  AC002066.1
# # . with 136,978 more rows
```



---

remap_filtered	<i>Downloads TF-target interactions from ReMap</i>
----------------	--

---

## Description

Downloads the ReMap TF-target interactions as processed by Garcia-Alonso et al. (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/#s1title>) and filters them based on a score threshold, the top targets and whether the TF is included in the TF census (Vaquerizas et al. 2009). The code for filtering is adapted from DoRothEA, written by Christian Holland.

## Usage

```
remap_filtered(score = 100, top_targets = 500, only_known_tfs = TRUE)
```

## Arguments

score	Numeric: a minimum score between 0 and 1000, records with lower scores will be excluded. If NULL no filtering performed.
top_targets	Numeric: the number of top scoring targets for each TF. Essentially the maximum number of targets per TF. If NULL the number of targets is not restricted.
only_known_tfs	Logical: whether to exclude TFs which are not in TF census.

## Value

Data frame with TF-target relationships.

## See Also

- [remap\\_tf\\_target\\_download](#)
- [remap\\_filtered](#)
- [tfcensus\\_download](#)

## Examples

```
remap_interactions <- remap_filtered()
nrow(remap_interactions)
# [1] 145680

remap_interactions <- remap_filtered(top_targets = 100)
remap_interactions
# # A tibble: 30,330 x 2
#   source_genesymbol target_genesymbol
#   <chr>              <chr>
# 1 ADNP              ABCC1
# 2 ADNP              ABT1
# 3 ADNP              AC006076.1
# 4 ADNP              AC007792.1
```

```
# 5 ADNP AC011288.2
# # . with 30,320 more rows
```

---

```
remap_tf_target_download
```

*Downloads TF-target interactions from ReMap*

---

## Description

ReMap (<http://remap.univ-amu.fr/>) is a database of ChIP-Seq experiments. It provides raw and merged peaks and CRMs (cis regulatory motifs) with their associations to regulators (TFs). TF-target relationships can be derived as it is written in Garcia-Alonso et al. 2019: "For ChIP-seq, we downloaded the binding peaks from ReMap and scored the interactions between each TF and each gene according to the distance between the TFBSs and the genes' transcription start sites. We evaluated different filtering strategies that consisted of selecting only the top-scoring 100, 200, 500, and 1000 target genes for each TF." (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/#s1title>). This function retrieves the full processed TF-target list from the data deposited in <https://zenodo.org/record/3713238>.

## Usage

```
remap_tf_target_download()
```

## Value

Data frame with TF-target relationships.

## See Also

- [remap\\_dorothea\\_download](#)
- [remap\\_filtered](#)

## Examples

```
remap_interactions <- remap_tf_target_download()
remap_interactions
# # A tibble: 9,546,470 x 4
#   source_genesymbol target_genesymbol target_ensembl   score
#   <chr>              <chr>              <chr>          <dbl>
# 1 ADNP                PTPRS                ENSG00000105426.16 1000
# 2 AFF4                PRKCH                ENSG00000027075.14 1000
# 3 AHR                 CTNND2               ENSG00000169862.18 1000
# 4 AR                  PDE4D                ENSG00000113448.18 1000
# 5 ARID1A              PLEC                 ENSG00000178209.14 1000
# # . with 9,546,460 more rows
```

---

resources_colname	<i>Name of the column with the resources</i>
-------------------	--

---

### Description

Unfortunately the column title is different across the various query types in the OmniPath web service, so we need to guess.

### Usage

```
resources_colname(data)
```

### Arguments

data            A data frame downloaded by any `import_...` function in the current package.

### Value

Character: the name of the column, if any of the column names matches.

### Examples

```
co <- import_omnipath_complexes()
resources_colname(co)
# [1] "sources"
```

---

simplify_intercell_network	<i>Simplify an intercell network</i>
----------------------------	--------------------------------------

---

### Description

The intercellular communication network data frames, created by `import_intercell_network`, are combinations of a network data frame with two copies of the intercell annotation data frames, all of them already having quite some columns. Here we keep only the names of the interacting pair, their intercellular communication roles, and the minimal information of the origin of both the interaction and the annotations. Optionally further columns can be selected.

### Usage

```
simplify_intercell_network(network, ...)
```

### Arguments

network        An intercell network data frame, as provided by `import_intercell_network`.  
 ...            Optional, further columns to select.

**Value**

An intercell network data frame with some columns removed.

**See Also**

- [import\\_intercell\\_network](#)
- [unique\\_intercell\\_network](#)
- [filter\\_intercell\\_network](#)

**Examples**

```
icn <- import_intercell_network()
icn_s <- simplify_intercell_network(icn)
```

---

swap_relations	<i>Reverse the direction of ontology relations</i>
----------------	--

---

**Description**

Reverse the direction of ontology relations

**Usage**

```
swap_relations(relations)
```

**Arguments**

**relations**      The ‘relations’ component of the data returned by [obo\\_parser](#) or any ‘...ontology\_download’ function such as [go\\_ontology\\_download](#). Depending on the `tables` argument of those functions the ‘relations’ can be a data frame or a nested list.

**Value**

Same type as the input, but the relations swapped: if in the input these pointed from each child to the parents, in the output they point from each parent to their children, and vice versa.

**See Also**

- [relations\\_list\\_to\\_table](#)
- [relations\\_table\\_to\\_list](#)
- [obo\\_parser](#)

**Examples**

```

goslim_url <-
  "http://current.geneontology.org/ontology/subsets/goslim_generic.obo"
path <- tempfile()
httr::GET(goslim_url, httr::write_disk(path, overwrite = TRUE))
obo <- obo_parser(path)
unlink(path)
rel_swapped <- swap_relations(obo$relations)

```

---

tfcensus_download	<i>Downloads the list of transcription factors from TF census</i>
-------------------	---

---

**Description**

Vaquerizas et al. published in 2009 a list of transcription factors. This function retrieves Supplementary Table 2 from the article (<http://www.nature.com/nrg/journal/v10/n4/index.html>).

**Usage**

```
tfcensus_download()
```

**Value**

A data frame (tibble) listing transcription factors.

**Examples**

```

tfcensus <- tfcensus_download()
tfcensus
# # A tibble: 1,987 x 7
#   Class `Ensembl ID` `IPI ID` `Interpro DBD` `Interpro DNA-b.
#   <chr> <chr>          <chr>      <chr>          <chr>
# 1 a     ENSG000000000. IPI0021. NA           IPR001289
# 2 a     ENSG000000000. IPI0004. IPR000047;IPR. NA
# 3 a     ENSG000000000. IPI0001. IPR001356;IPR. NA
# 4 a     ENSG000000000. IPI0029. IPR000910;IPR. NA
# 5 a     ENSG000000000. IPI0001. IPR007087;IPR. IPR006794
# # . with 1,977 more rows, and 2 more variables: `HGNC symbol` <chr>,
# # `Tissue-specificity` <chr>

```

---

translate_ids	<i>Translate gene and protein identifiers</i>
---------------	---

---

### Description

Translates a vector of identifiers, resulting a new vector, or a column of identifiers in a data frame by creating another column with the target identifiers.

### Usage

```
translate_ids(
  d,
  ...,
  uploadlists = FALSE,
  keep_untranslated = TRUE,
  return_df = FALSE,
  organism = 9606,
  reviewed = TRUE
)
```

### Arguments

d	Character vector or data frame.
...	At least two arguments, with or without names. The first of these arguments describes the source identifier, the rest of them describe the target identifier(s). The values of all these arguments must be valid identifier types as shown in Details. The names of the arguments are column names. In case of the first (source) ID the column must exist. For the rest of the IDs new columns will be created with the desired names. For ID types provided as arguments without names, the name of the ID type will be used for column name.
uploadlists	Force using the uploadlists service from UniProt. By default the plain query interface is used (implemented in <a href="#">uniprot_full_id_mapping_table</a> in this package). If any of the provided ID types is only available in the uploadlists service, it will be automatically selected. The plain query interface is preferred because in the long term, with caching, it requires less download and data storage.
keep_untranslated	In case the output is a data frame, keep the records where the source identifier could not be translated. At these records the target identifier will be NA.
return_df	Return a data frame even if the input is a vector.
organism	Integer, NCBI Taxonomy ID of the organism (by default 9606 for human). Matters only if uploadlists is FALSE.
reviewed	Translate only reviewed (TRUE), only unreviewed (FALSE) or both (NULL) UniProt records. Matters only if uploadlists is FALSE.

## Details

This function, depending on the `uploadlists` parameter, uses either the `uploadlists` service of UniProt or plain UniProt queries to obtain identifier translation tables. The possible values for `from` and `to` are the identifier type abbreviations used in the UniProt API, please refer to the table here: [https://www.uniprot.org/help/api\\_idmapping](https://www.uniprot.org/help/api_idmapping). In addition, simple synonyms are available which realize a uniform API for the `uploadlists` and UniProt query based backends. These are the followings:

OmnipathR	Uploadlists	UniProt query
uniprot	ACC	id
uniprot_entry	ID	entry name
genesymbol	GENENAME	genes(PREFERRED)
genesymbol_syn		genes(ALTERNATIVE)
hgnc	HGNC_ID	database(HGNC)
entrez	P_ENTREZGENEID	database(geneid)
ensg	ENSEMBLGENOME_ID	
enst	ENSEMBL_TRS_ID	database(ensembl)
ensp	ENSEMBL_PRO_ID	
ensgt	ENSEMBLGENOME_TRS_ID	
ensgp	ENSEMBLGENOME_PRO_ID	
ensembl	ENSEMBL_ID	
protein_name		protein names
refseqp	P_REFSEQ_AC	database(refseq)
refseqn	REFSEQ_NT_ID	
embl	EMBL	database(embl)
embl_id	EMBL_ID	
gi	P_GI	
pir	PIR	
pdb	PDB_ID	

The mapping between identifiers can be ambiguous. In this case one row in the original data frame yields multiple rows or elements in the returned data frame or vector(s).

## Value

- Data frame: if the input is a data frame or the input is a vector and `return_df` is TRUE.
- Vector: if the input is a vector, there is only one target ID type and `return_df` is FALSE.
- List of vectors: if the input is a vector, there are more than one target ID types and `return_df` is FALSE. The names of the list will be ID types (as they were column names, see the description of the `...` argument), and the list will also include the source IDs.

## See Also

- [uniprot\\_id\\_mapping\\_table](#)
- [uniprot\\_full\\_id\\_mapping\\_table](#)

**Examples**

```
d <- data.frame(uniprot_id = c('P00533', 'Q9ULV1', 'P43897', 'Q9Y2P5'))
d <- translate_ids(d, uniprot_id = uniprot, genesymbol)
d
#   uniprot_id genesymbol
# 1   P00533      EGFR
# 2   Q9ULV1      FZD4
# 3   P43897      TSFM
# 4   Q9Y2P5    SLC27A5
```

---

<code>trrust_download</code>	<i>Downloads TF-target interactions from TRRUST</i>
------------------------------	---

---

**Description**

TRRUST v2 (<https://www.grnpedia.org/trrust/>) is a database of literature mined TF-target interactions for human and mouse.

**Usage**

```
trrust_download(organism = "human")
```

**Arguments**

`organism`            Character: either "human" or "mouse".

**Value**

A data frame of TF-target interactions.

**Examples**

```
trrust_interactions <- trrust_download()
trrust_interactions
# # A tibble: 11,698 x 4
#   source_genesymbol target_genesymbol effect reference
#   <chr>              <chr>                <dbl> <chr>
# 1 AATF                BAX                    -1 22909821
# 2 AATF                CDKN1A                 0 17157788
# 3 AATF                KLK3                   0 23146908
# 4 AATF                MYC                     1 20549547
# 5 AATF                TP53                   0 17157788
# 6 ABL1                BAX                     1 11753601
# 7 ABL1                BCL2                   -1 11753601
# # . with 11,688 more rows
```



---

`uniprot_full_id_mapping_table`*Creates an ID translation table from UniProt data*

---

## Description

Creates an ID translation table from UniProt data

## Usage

```
uniprot_full_id_mapping_table(  
  to,  
  from = "id",  
  reviewed = TRUE,  
  organism = 9606  
)
```

## Arguments

<code>to</code>	Character or symbol: target ID type. See Details for possible values.
<code>from</code>	Character or symbol: source ID type. See Details for possible values.
<code>reviewed</code>	Translate only reviewed (TRUE), only unreviewed (FALSE) or both (NULL) UniProt records.
<code>organism</code>	Integer, NCBI Taxonomy ID of the organism (by default 9606 for human).

## Details

For both source and target ID type, this function accepts column codes used by UniProt and some simple shortcuts defined here. For the UniProt codes please refer to <https://www.uniprot.org/help/uniprotkb>. The shortcuts are `entrez`, `genesymbol`, `genesymbol_syn` (synonym gene symbols), `hgnc`, `embl`, `refseqp` (RefSeq protein), `enst` (Ensembl transcript), `uniprot_entry` (UniProtKB AC, e.g. EGFR\_HUMAN), `protein_name` (full name of the protein), `uniprot` (UniProtKB ID, e.g. P00533). For a complete table please refer to [translate\\_ids](#).

## Value

A data frame (tibble) with columns 'From' and 'To', UniProt IDs and the corresponding foreign IDs, respectively.

## See Also

[translate\\_ids](#)

**Examples**

```
uniprot_entrez <- uniprot_full_id_mapping_table(to = 'entrez')
uniprot_entrez
# # A tibble: 20,723 x 2
#   From To
#   <chr> <chr>
# 1 Q96R72 NA
# 2 Q9UKL2 23538
# 3 Q9H205 144125
# 4 Q8NGN2 219873
# 5 Q8NGC1 390439
# # . with 20,713 more rows
```

---

```
uniprot_id_mapping_table
```

*Retrieves an identifier translation table from the UniProt uploadlists service*

---

**Description**

Retrieves an identifier translation table from the UniProt uploadlists service

**Usage**

```
uniprot_id_mapping_table(identifiers, from, to, chunk_size = 5000)
```

**Arguments**

identifiers	Character vector of identifiers
from	Character or symbol: type of the identifiers provided. See Details for possible values.
to	Character or symbol: identifier type to be retrieved from UniProt. See Details for possible values.
chunk_size	Integer: query the identifiers in chunks of this size. If you are experiencing download failures, try lower values.

**Details**

This function uses the uploadlists service of UniProt to obtain identifier translation tables. The possible values for 'from' and 'to' are the identifier type abbreviations used in the UniProt API, please refer to the table here: [https://www.uniprot.org/help/api\\_idmapping](https://www.uniprot.org/help/api_idmapping) or the table of synonyms supported by the current package: [translate\\_ids](#). Note: if the number of identifiers is larger than the chunk size the log message about the cache origin is not guaranteed to be correct (most of the times it is still correct).

**Value**

A data frame (tibble) with columns 'From' and 'To', the identifiers provided and the corresponding target IDs, respectively.

**See Also**

[translate\\_ids](#)

**Examples**

```
uniprot_genesymbol <- uniprot_id_mapping_table(
  c('P00533', 'P23771'), uniprot, genesymbol
)
uniprot_genesymbol
# # A tibble: 2 x 2
#   From To
#   <chr> <chr>
# 1 P00533 EGFR
# 2 P23771 GATA3
```

---

unique\_intercell\_network

*Unique intercellular interactions*

---

**Description**

In the intercellular network data frames produced by [import\\_intercell\\_network](#), by default each pair of annotations for an interaction is represented in a separate row. This function drops the annotations and keeps only the distinct interacting pairs.

**Usage**

```
unique_intercell_network(network, ...)
```

**Arguments**

network	An intercellular network data frame as produced by <a href="#">import_intercell_network</a> .
...	Additional columns to keep. Note: if these have multiple values for an interacting pair, only the first row will be preserved.

**Value**

A data frame with interacting pairs and interaction attributes.

**See Also**

- [import\\_intercell\\_network](#)
- [simplify\\_intercell\\_network](#)
- [filter\\_intercell\\_network](#)

**Examples**

```
icn <- import_intercell_network()
icn_unique <- unique_intercell_network(icn)
```

---

vinayagam\_download      *Protein-protein interactions from Vinayagam 2011*

---

**Description**

Retrieves the Supplementary Table S6 from Vinayagam et al. 2011. Find out more at <https://doi.org/10.1126/scisignal.2001699>.

**Usage**

```
vinayagam_download()
```

**Value**

A data frame (tibble) with interactions.

**Examples**

```
vinayagam_interactions <- vinayagam_download()
vinayagam_interactions
# # A tibble: 34,814 x 5
#   `Input-node Gen.` `Input-node Gen.` `Output-node Ge.` `Output-node Ge.`
#   <chr>             <dbl> <chr>             <dbl>
# 1 C1orf103          55791 MNAT1           4331
# 2 MAST2            23139 DYNLL1           8655
# 3 RAB22A           57403 APPL2          55198
# 4 TRAP1            10131 EXT2           2132
# 5 STAT2            6773  COPS4           51138
# # . with 34,804 more rows, and 1 more variable:
# # `Edge direction score` <dbl>
```

---

walk\_ontology\_tree      *All nodes of a subtree starting from the selected nodes*

---

### Description

Starting from the selected nodes, recursively walks the ontology tree until it reaches either the root or leaf nodes. Collects all visited nodes.

### Usage

```
walk_ontology_tree(  
  terms,  
  ancestors = TRUE,  
  db_key = "go_basic",  
  ids = TRUE,  
  method = "gra",  
  relations = c("is_a", "part_of", "occurs_in", "regulates", "positively_regulates",  
               "negatively_regulates")  
)
```

### Arguments

terms	Character vector of ontology term IDs or names. A mixture of IDs and names can be provided.
ancestors	Logical: if FALSE the ontology tree is traversed towards the leaf nodes; if TRUE, the tree is traversed until the root. The former returns the ancestors (parents), the latter the descendants (children).
db_key	Character: key to identify the ontology database. For the available keys see <a href="#">omnipath_show_db</a> .
ids	Logical: whether to return IDs or term names.
method	Character: either "gra" or "lst". The implementation to use for traversing the ontology tree. The graph based implementation is faster than the list based, the latter will be removed in the future.
relations	Character vector of ontology relation types. Only these relations will be used.

### Details

Note: this function relies on the database manager, the first call might take long because of the database load process. Subsequent calls within a short period should be faster. See [get\\_ontology\\_db](#).

### Value

Character vector of ontology IDs. If the input terms are all leaves or roots NULL is returned. The starting nodes won't be included in the result unless they fall onto the traversal path from other nodes.

**See Also**

- [omnipath\\_show\\_db](#)
- [get\\_ontology\\_db](#)

**Examples**

```
walk_ontology_tree(c('GO:0006241', 'GO:0044211'))
# [1] "GO:0006139" "GO:0006220" "GO:0006221" "GO:0006241" "GO:0006725"
# [6] "GO:0006753" "GO:0006793" "GO:0006796" "GO:0006807" "GO:0008150"
# ... (truncated)
walk_ontology_tree(c('GO:0006241', 'GO:0044211'), ancestors = FALSE)
# [1] "GO:0044210" "GO:0044211"
walk_ontology_tree(
  c('GO:0006241', 'GO:0044211'),
  ancestors = FALSE,
  ids = FALSE
)
# [1] "'de novo' CTP biosynthetic process" "CTP salvage"
```

---

zenodo\_download

*Retrieves data from Zenodo*


---

**Description**

Zenodo is a repository of large scientific datasets. Many projects and publications make their datasets available at Zenodo. This function downloads an archive from Zenodo and extracts the requested file.

**Usage**

```
zenodo_download(
  path,
  reader = NULL,
  reader_param = list(),
  url_key = NULL,
  zenodo_record = NULL,
  zenodo_fname = NULL,
  url_param = list(),
  url_key_param = list(),
  ...
)
```

**Arguments**

`path` Character: path to the file within the archive.  
`reader` Optional, a function to read the connection.

reader_param	List: arguments for the reader function.
url_key	Character: name of the option containing the URL
zenodo_record	The Zenodo record ID, either integer or character.
zenodo_fname	The file name within the record.
url_param	List: variables to insert into the URL string (which is returned from the options).
url_key_param	List: variables to insert into the 'url_key'.
...	Passed to archive_extractor

**Value**

A connection

**Examples**

```
# an example from the OmnipathR::remap_tf_target_download function:
remap_dorothea <- zenodo_download(
  zenodo_record = 3713238,
  zenodo_fname = 'tf_target_sources.zip',
  path = (
    'tf_target_sources/chip_seq/remap/gene_tf_pairs_genesymbol.txt'
  ),
  reader = read_tsv,
  reader_param = list(
    col_names = c(
      'source_genesymbol',
      'target_genesymbol',
      'target_ensembl',
      'score'
    ),
    col_types = cols(),
    progress = FALSE
  ),
  resource = 'ReMap'
)
```

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