

# Package ‘MetMashR’

November 13, 2024

**Type** Package

**Title** Metabolite Mashing with R

**Version** 1.0.0

**Description** A package to merge, filter sort, organise and otherwise mash together metabolite annotation tables. Metabolite annotations can be imported from multiple sources (software) and combined using workflow steps based on S4 class templates derived from the `struct` package. Other modular workflow steps such as filtering, merging, splitting, normalisation and rest-api queries are included.

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'BiocFileCache\_database\_class.R' 'CompoundDb\_source\_class.R'  
'MTox700plus\_database\_class.R' 'MetMashR-package.R'  
'PathBank\_metabolite\_database\_class.R' 'add\_columns\_class.R'  
'add\_labels\_class.R' 'annotation\_bar\_chart.R'  
'annotation\_histogram\_class.R' 'annotation\_histogram2d\_class.R'  
'annotation\_pie\_chart.R' 'annotation\_table\_class.R'  
'annotation\_upset\_chart\_class.R' 'annotation\_venn\_chart.R'  
'calc\_ppm\_diff\_class.R' 'calc\_rt\_diff\_class.R'  
'lcms\_table\_class.R' 'cd\_source\_class.R' 'chart\_plot\_doc.R'  
'rest\_api\_parsers.R' 'rest\_api\_class.R'  
'classifyfire\_lookup\_class.R' 'combine\_columns\_class.R'  
'combine\_records\_class.R' 'combine\_sources.R'  
'compute\_column\_class.R' 'compute\_record\_class.R'  
'database\_lookup\_class.R' 'dictionaries.R'  
'eutils\_lookup\_class.R' 'excel\_database\_class.R'  
'expand\_records\_class.R' 'filter\_labels\_class.R'

'filter\_na\_class.R' 'filter\_range\_class.R'  
 'filter\_records\_class.R' 'filter\_venn\_class.R'  
 'github\_file\_class.R' 'go\_database\_class.R'  
 'hmdb\_lookup\_class.R' 'id\_count\_class.R'  
 'import\_source\_class.R' 'kegg\_lookup\_class.R'  
 'lipidmaps\_lookup\_class.R' 'ls\_source\_class.R'  
 'model\_apply\_doc.R' 'mspurity\_source\_class.R'  
 'mwb\_compound\_lookup\_class.R' 'mwb\_refmet\_database\_class.R'  
 'mwb\_structure\_chart\_class.R' 'mz\_match\_class.R'  
 'mzrt\_match\_class.R' 'normalise\_lipids\_class.R'  
 'normalise\_strings\_class.R' 'openbabel\_structure\_chart.R'  
 'opsin\_lookup\_class.R' 'pivot\_columns\_class.R'  
 'prioritise\_columns\_class.R' 'pubchem\_compound\_lookup\_class.R'  
 'pubchem\_property\_lookup\_class.R'  
 'pubchem\_structure\_chart\_class.R'  
 'pubchem\_structure\_lookup\_class.R' 'pubchem\_widget.R'  
 'rdata\_database\_class.R' 'rds\_database\_class.R'  
 'rds\_cache\_class.R' 'remove\_columns\_class.R'  
 'rename\_columns\_class.R' 'rt\_match\_class.R'  
 'select\_columns\_class.R' 'split\_column\_class.R'  
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 msPurity, ChemmineOB, rsvg, metabolomicsWorkbenchR, KEGGREST,  
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MetMashR-package

*MetMashR: Metabolite Mashing with R***Description**

A package to merge, filter sort, organise and otherwise mash together metabolite annotation tables. Metabolite annotations can be imported from multiple sources (software) and combined using workflow steps based on S4 class templates derived from the 'struct' package. Other modular workflow steps such as filtering, merging, splitting, normalisation and rest-api queries are included.

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**See Also**

Useful links:

- <https://computational-metabolomics.github.io/MetMashR/>
- Report bugs at <https://github.com/computational-metabolomics/MetMashR/issues>

---

add\_columns

*Add columns*

---

**Description**

A wrapper around `dplyr::left_join`. Adds columns to an annotation table by performing a left-join with an input data.frame (annotations on the left of the join).

**Usage**

```
add_columns(new_columns, by, ...)
```

**Arguments**

<code>new_columns</code>	(data.frame, annotation_database) A data.frame to be left-joined to the annotation table. Can also be an annotation_database.
<code>by</code>	(character) A (named) character vector of column names to join by e.g. <code>c("A" = "B")</code> (see <code>dplyr::left_join</code> for details).
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

**Details**

This object makes use of functionality from the following packages:

- `dplyr`

**Value**

A `add_columns` object with the following output slots:

<code>updated</code>	(annotation_source) The updated annotations as an <code>annotation_source</code> object.
----------------------	--

**Inheritance**

A `add_columns` object inherits the following struct classes:

```
[add_columns] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

## See Also

[dplyr::left\\_join\(\)](#)

## Examples

```
M <- add_columns(
  new_columns = data.frame(),
  by = "id")
```

---

add_labels	<i>Add column of labels</i>
------------	-----------------------------

---

## Description

Adds new columns with the specified labels for each record.

## Usage

```
add_labels(labels, replace = FALSE, ...)
```

## Arguments

labels	(list) A named list of columns and the label to use for all records in that column.
replace	(logical) Replace columns. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "TRUE": If present, the new columns will replace existing columns in the source data.frame.</li> <li>• "FALSE": An error will be thrown if the new columns are already in the source data.frame.</li> </ul> The default is FALSE.
...	Additional slots and values passed to <code>struct_class</code> .

## Details

This object makes use of functionality from the following packages:

- dplyr

## Value

A `add_labels` object with the following output slots:

`updated` (`annotation_source`) The updated annotations as an `annotation_source` object.

## Inheritance

A `add_labels` object inherits the following struct classes:

```
[add_labels] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

## Examples

```
M <- add_labels(  
  labels = list(),  
  replace = FALSE)
```

---

AnnotationDb\_database *AnnotationDb database*

---

## Description

Retrieve a table from an AnnotationDb package.

## Usage

```
AnnotationDb_database(source, table, ...)
```

## Arguments

<code>source</code>	(character) The name of an AnnotationDb package to import the specified table from. Note the package should already be installed.
<code>table</code>	(character) The name of a table to import from the specified source AnnotationDb package.
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

## Details

This object makes use of functionality from the following packages:

- AnnotationDbi

## Value

A `AnnotationDb_database` object. This object has no output slots.

## Inheritance

A `AnnotationDb_database` object inherits the following struct classes:

```
[AnnotationDb_database] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

## References

Pagès H, Carlson M, Falcon S, Li N (2023). *AnnotationDbi: Manipulation of SQLite-based annotations in Bioconductor*. doi:10.18129/B9.bioc.AnnotationDbi <https://doi.org/10.18129/B9.bioc.AnnotationDbi>, R package version 1.64.1, <https://bioconductor.org/packages/AnnotationDbi>.

## See Also

[AnnotationDbi::AnnotationDb](#)

Other annotation databases: [GO\\_database](#), [annotation\\_database](#), [annotation\\_source](#), [excel\\_database](#), [rdata\\_database](#), [rds\\_cache](#), [rds\\_database](#)

## Examples

```
M <- AnnotationDb_database(
  table = character(),
  tag = character(),
  data = data.frame(),
  source = character())
```

---

AnnotationDb\_select     *Select columns from AnnotationDb database*

---

## Description

A wrapper around `[annotationDbi::select()]` that can be used to import columns from the database where the keys are provided by a column in the annotation table.

## Usage

```
AnnotationDb_select(
  database,
  key_column,
  key_type,
  database_columns,
  drop_na = TRUE,
  ...
)
```

## Arguments

<code>database</code>	(character) The name of the AnnotationDbi package/object to import.
<code>key_column</code>	(character) The name of a column in the annotation table containing key values used to extract records from the AnnotationDbi database.
<code>key_type</code>	(character) The name of a column in the AnnoationDb database searched for matches to the key values.
<code>database_columns</code>	(character) The name of columns to import from the AnnoationDb database. Special case <code>.all</code> can be used to get all columns.



drop\_na (logical) Drop NA. Allowed values are limited to the following:

- "TRUE": Remove rows where all columns of the returned database are NA.
- "FALSE": Keep rows where all columns of the returned database are NA.

The default is TRUE.

... Additional slots and values passed to struct\_class.

### Details

This object makes use of functionality from the following packages:

- dplyr
- AnnotationDbi

### Value

A AnnotationDb\_select object with the following output slots:

updated (annotation\_source) The updated annotations as an annotation\_source object.

### Inheritance

A AnnotationDb\_select object inherits the following struct classes:

[AnnotationDb\_select] -> [model] -> [struct\_class]

### References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

Pagès H, Carlson M, Falcon S, Li N (2023). *AnnotationDbi: Manipulation of SQLite-based annotations in Bioconductor*. doi:10.18129/B9.bioc.AnnotationDbi <https://doi.org/10.18129/B9.bioc.AnnotationDbi>, R package version 1.64.1, <https://bioconductor.org/packages/AnnotationDbi>.

### See Also

[dplyr::left\\_join\(\)](#)  
[AnnotationDbi::select\(\)](#)

### Examples

```
M <- AnnotationDb_select(  
  database = "",  
  key_column = "",  
  key_type = "",  
  database_columns = ".all",  
  drop_na = FALSE)
```

---

annotation\_bar\_chart *Annotation bar chart*

---

### Description

Display a bar chart of labels in the specified column of an `annotation_source`.

### Usage

```
annotation_bar_chart(  
  factor_name,  
  label_rotation = FALSE,  
  label_location = "inside",  
  label_type = "percent",  
  legend = FALSE,  
  ...  
)
```

### Arguments

- `factor_name` (character) The name of the column in the `annotation_source` to generate a chart from.
- `label_rotation` (logical) Rotate labels. Allowed values are limited to the following:
- "TRUE": Rotate labels to match segments.
  - "FALSE": Do not rotate labels.
- The default is FALSE.
- `label_location` (character) Label location. Allowed values are limited to the following:
- "inside": Labels are displayed inside the bars.
  - "outside": Labels are displayed outside the bars.
- The default is "inside".
- `label_type` (character) Label type. Allowed values are limited to the following:
- "percent": Labels will include the percentage for the segment.
  - "count": Labels will include the count for the segment.
  - "none": Labels will not include extra information.
- The default is "percent".
- `legend` (logical) Display legend. Allowed values are limited to the following:
- "TRUE": Groups are indicated using a legend.
  - "FALSE": Groups are indicated in the labels.
- The default is FALSE.
- ... Additional slots and values passed to `struct_class`.

### Details

This object makes use of functionality from the following packages:

- ggplot2

**Value**

A `annotation_bar_chart` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

**Inheritance**

A `annotation_bar_chart` object inherits the following struct classes:

```
[annotation_bar_chart] -> [chart] -> [struct_class]
```

**References**

Wickham H (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. ISBN 978-3-319-24277-4, <https://ggplot2.tidyverse.org>.

**Examples**

```
M <- annotation_bar_chart(  
  factor_name = "V1",  
  label_location = "inside",  
  label_rotation = FALSE,  
  legend = FALSE,  
  label_type = "percent")
```

---

annotation\_database    *An annotation database*

---

**Description**

An `annotation_database` is an `annotation_source()` where the imported `data.frame` contains meta data for annotations. For example it might be a table of molecular identifiers, associated pathways etc.

**Usage**

```
annotation_database(data = data.frame(), tag = "", ...)
```

**Arguments**

<code>data</code>	( <code>data.frame</code> , <code>NULL</code> ) A <code>data.frame</code> of annotation data. The default is <code>data.frame()</code> .
<code>tag</code>	( <code>character</code> ) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is <code>""</code> .
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

**Value**

A `annotation_database` object. This object has no output slots.

**Inheritance**

A `annotation_database` object inherits the following struct classes:

```
[annotation_database] -> [annotation_source] -> [struct_class]
```

**See Also**

Other annotation databases: [AnnotationDb\\_database](#), [GO\\_database](#), [annotation\\_source](#), [excel\\_database](#), [rdata\\_database](#), [rds\\_cache](#), [rds\\_database](#)

Other annotation sources: [annotation\\_table](#), [cd\\_source](#), [ls\\_source](#), [mspurity\\_source](#)

**Examples**

```
M <- annotation_database(
  tag = character(0),
  data = data.frame(),
  source = "ANY")
```

---

annotation\_histogram *Annotation histogram*

---

**Description**

Display a histogram of value in the specified column of an `annotation_source`.

**Usage**

```
annotation_histogram(
  factor_name,
  bins = 30,
  bin_edge = "grey",
  bin_fill = "lightgrey",
  vline = NULL,
  vline_colour = "red",
  ...
)
```

**Arguments**

<code>factor_name</code>	(character) The name of the column in the <code>annotation_source</code> to generate a histogram from.
<code>bins</code>	(numeric, integer) The number of bins to use when computing the histogram. The default is 30.
<code>bin_edge</code>	(character) The colour to use when plotting the edges of bins. The default is "grey".
<code>bin_fill</code>	(character) The colour to use when plotting the bins. The default is "lightgrey".
<code>vline</code>	(numeric, NULL, list) The x-axis location of vertical lines used to indicate e.g. upper and lower limits. Use NULL if not required. The default is NULL.
<code>vline_colour</code>	(character) The colour to use when plotting vertical lines. The default is "red".
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

## Details

This object makes use of functionality from the following packages:

- ggplot2

## Value

A `annotation_histogram` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `annotation_histogram` object inherits the following struct classes:

```
[annotation_histogram] -> [chart] -> [struct_class]
```

## References

Wickham H (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. ISBN 978-3-319-24277-4, <https://ggplot2.tidyverse.org>.

## Examples

```
M <- annotation_histogram(  
  factor_name = "V1",  
  bins = 30,  
  bin_edge = "grey",  
  bin_fill = "lightgrey",  
  vline = NULL,  
  vline_colour = "red")
```

---

annotation\_histogram2d

*Annotation 2D histogram*

---

## Description

Display a histogram of value in the specified columns of an `annotation_source`.

## Usage

```
annotation_histogram2d(  
  factor_name,  
  bins = 30,  
  bin_edge = "grey",  
  bin_fill = "lightgrey",  
  vline = NULL,  
  vline_colour = "red",  
  ...  
)
```

**Arguments**

factor_name	(character) The names of the two columns in the annotation_source to generate histograms from.
bins	(numeric, integer) The number of bins to use when computing the histograms. The default is 30.
bin_edge	(character) The colour to use when plotting the edges of bins. The default is "grey".
bin_fill	(character) The colour to use when plotting the bins. The default is "lightgrey".
vline	(numeric, NULL, list) The x-axis location of lines used to indicate e.g. upper and lower limits. Use NULL if not required. A 2 element list can be provided to set vlines for each factor_name. The default is NULL.
vline_colour	(character) The colour to use when plotting vertical lines. The default is "red".
...	Additional slots and values passed to struct_class.

**Details**

This object makes use of functionality from the following packages:

- ggplot2
- patchwork

**Value**

A annotation\_histogram2d object. This object has no output slots. See `chart_plot` in the struct package to plot this chart object.

**Inheritance**

A annotation\_histogram2d object inherits the following struct classes:

```
[annotation_histogram2d] -> [annotation_histogram] -> [chart] -> [struct_class]
```

**References**

Wickham H (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. ISBN 978-3-319-24277-4, <https://ggplot2.tidyverse.org>.

Pedersen T (2024). *patchwork: The Composer of Plots*. R package version 1.2.0, <https://CRAN.R-project.org/package=patchwork>.

**Examples**

```
M <- annotation_histogram2d(
  factor_name = "V1",
  bins = 30,
  bin_edge = "grey",
  bin_fill = "lightgrey",
  vline = NULL,
  vline_colour = "red")
```

---

annotation\_pie\_chart *Annotation pie chart*

---

### Description

Display a pie chart of labels in the specified column of an annotation\_source.

### Usage

```
annotation_pie_chart(  
  factor_name,  
  label_rotation = FALSE,  
  label_location = "inside",  
  label_type = "percent",  
  legend = FALSE,  
  pie_rotation = 0,  
  centre_radius = 0,  
  centre_label = NULL,  
  count_na = FALSE,  
  ...  
)
```

### Arguments

- factor\_name** (character) The name of the column in the annotation\_source to generate a pie chart from.
- label\_rotation** (logical) Rotate labels. Allowed values are limited to the following:
- "TRUE": Rotate labels to match segments.
  - "FALSE": Do not rotate labels.
- The default is FALSE.
- label\_location** (character) Label location. Allowed values are limited to the following:
- "inside": Labels are displayed inside the segments.
  - "outside": Labels are displayed outside the segments.
- The default is "inside".
- label\_type** (character) Label type. Allowed values are limited to the following:
- "percent": Labels will include the percentage for the segment.
  - "count": Labels will include the count for the segment.
  - "none": Labels will not include extra information.
- The default is "percent".
- legend** (logical) Display legend. Allowed values are limited to the following:
- "TRUE": Groups are indicated using a legend.
  - "FALSE": Groups are indicated in the labels.
- The default is FALSE.

pie_rotation	(numeric) The number of degrees to rotate the pie chart by, clockwise. The default is 0.
centre_radius	(numeric, integer) The radius of the centre circle. Used to make a "donut" plot. Should be a value between 0 and 1. The default is 0.
centre_label	(NULL, character) The text to display in the centre of the pie chart. Mostly used with donut plots where centre_radius is greater than 0. The default is NULL.
count_na	(logical) Include the number of missing values in the pie chart. The default is FALSE.
...	Additional slots and values passed to struct_class.

### Details

This object makes use of functionality from the following packages:

- ggplot2

### Value

A `annotation_pie_chart` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

### Inheritance

A `annotation_pie_chart` object inherits the following struct classes:

```
[annotation_pie_chart] -> [chart] -> [struct_class]
```

### References

Wickham H (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. ISBN 978-3-319-24277-4, <https://ggplot2.tidyverse.org>.

### Examples

```
M <- annotation_pie_chart(
  factor_name = "V1",
  label_location = "inside",
  label_rotation = FALSE,
  legend = FALSE,
  pie_rotation = 0,
  label_type = "percent",
  centre_radius = 0,
  centre_label = NULL,
  count_na = FALSE)
```



---

annotation_source	<i>An annotation source</i>
-------------------	-----------------------------

---

## Description

A base class defining an annotation source. This object is extended by MetmashR to define other objects.

## Usage

```
annotation_source(source = character(0), data = data.frame(), tag = "", ...)
```

## Arguments

source	(ANY) The source of annotation data. The default is <code>character(0)</code> .
data	(data.frame, NULL) A data.frame of annotation data. The default is <code>data.frame()</code> .
tag	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is <code>""</code> .
...	Additional slots and values passed to <code>struct_class</code> .

## Value

A `annotation_source` object. This object has no output slots.

## Inheritance

A `annotation_source` object inherits the following struct classes:

```
[annotation_source] -> [struct_class]
```

## See Also

Other annotation databases: [AnnotationDb\\_database](#), [GO\\_database](#), [annotation\\_database](#), [excel\\_database](#), [rdata\\_database](#), [rds\\_cache](#), [rds\\_database](#)

## Examples

```
M <- annotation_source(
  tag = character(0),
  data = data.frame(),
  source = "ANY")
```

---

annotation_table	<i>An annotation table</i>
------------------	----------------------------

---

### Description

An `annotation_table` is an `annotation_source()` where the imported `data.frame` contains measured experimental data. An `id_column` of values is required to uniquely identify each record (row) in the table (NB these are NOT molecule identifiers, which may be present in multiple records).

### Usage

```
annotation_table(data = data.frame(), tag = "", id_column = NULL, ...)
```

### Arguments

<code>data</code>	( <code>data.frame</code> , <code>NULL</code> ) A <code>data.frame</code> of annotation data. The default is <code>data.frame()</code> .
<code>tag</code>	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is <code>""</code> .
<code>id_column</code>	(character) The column name of the annotation <code>data.frame</code> containing row identifiers. If <code>NULL</code> This will be generated automatically. The default is <code>NULL</code> .
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

### Value

A `annotation_table` object. This object has no output slots.

### Inheritance

A `annotation_table` object inherits the following struct classes:

```
[annotation_table] -> [annotation_source] -> [struct_class]
```

### See Also

Other annotation tables: [cd\\_source](#), [ls\\_source](#)

Other annotation sources: [annotation\\_database](#), [cd\\_source](#), [ls\\_source](#), [mspurity\\_source](#)

### Examples

```
M <- annotation_table(  
  id_column = "id",  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

 annotation\_upset\_chart

*Annotation UpSet chart*


---

## Description

Display an UpSet chart of labels in the specified column of an annotation\_source.

## Usage

```

annotation_upset_chart(
  factor_name,
  group_column = NULL,
  width_ratio = 0.2,
  xlabel = "group",
  sort_intersections = "descending",
  intersections = "observed",
  n_intersections = NULL,
  min_size = 0,
  queries = list(),
  keep_empty_groups = FALSE,
  ...
)

```

## Arguments

factor_name	(character) The name of the column(s) in the annotation_source(s) to generate an UpSet chart from.
group_column	(character, NULL) The name of the column in the annotation_source to create groups from in the Venn diagram. This parameter is ignored if there are multiple input tables, as each table is considered to be a group. This parameter is also ignored if more than one factor_name is provided, as each column is considered a group. The default is NULL.
width_ratio	(numeric) Proportion of plot given to set size bar chart. The default is 0.2.
xlabel	(character) The label used for the x-axis. The default is "group".
sort_intersections	(character) Sort intersections. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"ascending": Groups are sorted by increasing size.</li> <li>"descending": Groups are sorted by decreasing size.</li> <li>"none": Groups are not sorted.</li> </ul> The default is "descending".
intersections	(character, list) The intersections to include in the plot. The default is "observed".
n_intersections	(numeric, integer, NULL) The number of intersections to include in the plot. The default is NULL.
min_size	(numeric, integer) The minimum size of an intersection for it to be included in the plot. The default is 0.

queries (list) A list of upset queries. The default is `list()`.

keep\_empty\_groups (logical) Whether empty sets should be kept (including sets which are only empty after filtering by size). The default is `FALSE`.

... Additional slots and values passed to `struct_class`.

## Details

This object makes use of functionality from the following packages:

- ComplexUpset

## Value

A `annotation_upset_chart` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `annotation_upset_chart` object inherits the following struct classes:

```
[annotation_upset_chart] -> [chart] -> [struct_class]
```

## References

Krassowski M (2020). "ComplexUpset." doi:10.5281/zenodo.3700590 <https://doi.org/10.5281/zenodo.3700590>, <https://doi.org/10.5281/zenodo.3700590>.

Lex A, Gehlenborg N, Strobel H, Vuillemot R, Pfister H (2014). "UpSet: Visualization of Intersecting Sets,." *IEEE Transactions on Visualization and Computer Graphics*, 20(12), 1983–1992. doi:10.1109/TVCG.2014.2346248 <https://doi.org/10.1109/TVCG.2014.2346248>, <https://doi.org/10.1109/TVCG.2014.2346248>.

## Examples

```
M <- annotation_upset_chart(
  factor_name = "V1",
  group_column = NULL,
  width_ratio = 0.2,
  xlabel = "group",
  sort_intersections = "descending",
  intersections = "observed",
  n_intersections = NULL,
  min_size = 0,
  queries = list(),
  keep_empty_groups = FALSE)
```

---

 annotation\_venn\_chart *Annotation venn chart*


---

## Description

Display a venn diagram of labels present in two annotation\_sources.

## Usage

```
annotation_venn_chart(
  factor_name,
  group_column = NULL,
  fill_colour = "white",
  line_colour = "black",
  labels = TRUE,
  legend = FALSE,
  ...
)
```

## Arguments

- |              |   |
|--------------|---|
| factor_name  | (character) The name of the column(s) in the annotation_source to generate a chart from. Up to seven columns can be compared for a single annotation_source.  |
| group_column | (character, NULL) The name of the column in the annotation_source to create groups from in the Venn diagram. This parameter is ignored if there are multiple input tables, as each table is considered to be a group. This parameter is also ignored if more than one factor_name is provided, as each column is considered a group. The default is NULL. |
| fill_colour  | (character) The line colour of the groups in a format compatible with ggplot e.g. "black" or "#000000". Special case ".group" sets the colour based on the group label and "none" will not fill the groups. The default is "white".   |
| line_colour  | (character) The line colour of the groups in a format compatible with ggplot e.g. "black" or "#000000". Special case ".group" sets the colour based on the group label, and ".none" will not display lines. The default is "black".   |
| labels       | (logical) Group labels. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "TRUE": Include group labels on the plot.</li> <li>• "FALSE": Do not include group labels on the plot.</li> </ul> The default is TRUE.  |
| legend       | (logical) Legend. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "TRUE": Include a legend in the plot.</li> <li>• "FALSE": Do not include a legend in the plot.</li> </ul> The default is FALSE.   |
| ...          | Additional slots and values passed to struct_class.   |

## Details

This object makes use of functionality from the following packages:

- RVenndiagram
- ggVennDiagram

## Value

A `annotation_venn_chart` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `annotation_venn_chart` object inherits the following struct classes:

```
[annotation_venn_chart] -> [chart] -> [struct_class]
```

## References

Akyol T (2019). *RVenn: Set Operations for Many Sets*. R package version 1.1.0, <https://CRAN.R-project.org/package=RVenn>.

Gao C, Dusa A (2024). *ggVennDiagram: A 'ggplot2' Implement of Venn Diagram*. R package version 1.5.2, <https://CRAN.R-project.org/package=ggVennDiagram>.

## Examples

```
M <- annotation_venn_chart(  
  factor_name = "V1",  
  line_colour = ".group",  
  fill_colour = ".group",  
  labels = FALSE,  
  legend = FALSE,  
  group_column = NULL)
```

---

BiocFileCache\_database

*Cached database*

---

## Description

A cached resource using BiocFileCache.

## Usage

```
BiocFileCache_database(  
  source,  
  bfc_path = NULL,  
  resource_name,  
  bfc_fun = cache_as_is,  
  import_fun = read.csv,  
  offline = FALSE,  
  ...  
)
```

**Arguments**

source	(ANY) The source of annotation data.
bfc_path	(character, NULL) BiocFileCache is used to cache the database locally and prevent unnecessary downloads. If a path is provided then BiocFileCache will use this location. If NULL it will use the default location (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is NULL.
resource_name	(character) The name given to this resource in the cache. (see <a href="#">BiocFileCache::BiocFileCache()</a> for details).
bfc_fun	(function) A function to process the object before storing it in the cache, e.g. to store an unzipped file in the cache instead of the zipped version. This would prevent needing to unzip the resource each time it is retrieved from the cache, but would mean using more space on disk. The default function does nothing to the resource. See <a href="#">BiocFileCache::bfcdownload()</a> for details.
import_fun	(function) A function to process the object after retrieving it from the cache e.g. it might need to be unzipped before importing as a data.frame. This function should take the path to the cached object as the first input and return a data.frame.
offline	(logical) If offline = FALSE then checks to determine if the resource has expired will be skipped, and retrieved directly from the cache. The default is FALSE.
...	Additional slots and values passed to struct_class.

**Details**

This object makes use of functionality from the following packages:

- BiocFileCache

**Value**

A BiocFileCache\_database object. This object has no output slots.

**Inheritance**

A BiocFileCache\_database object inherits the following struct classes:

```
[BiocFileCache_database] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

**References**

Shepherd L, Morgan M (2024). *BiocFileCache: Manage Files Across Sessions*. R package version 2.10.2.

**See Also**

Other database: [sqlite\\_database](#)

## Examples

```
M <- BiocFileCache_database(  
  bfc_path = NULL,  
  resource_name = "bfc",  
  bfc_fun = function(){},  
  import_fun = function(){},  
  offline = FALSE,  
  tag = character(),  
  data = data.frame(),  
  source = "ANY")
```

---

cache\_as\_is

*Cache file with no changes using BiocFileCache*

---

## Description

This helper function is for use with BiocFileCache objects. Using it will copy the file directly to the cache without making any changes.

## Usage

```
cache_as_is(from, to)
```

## Arguments

from	incoming path
to	the outgoing path

## Value

TRUE if successful

## Examples

```
M <- BiocFileCache_database(  
  source = tempfile(),  
  resource_name = "example",  
  bfc_fun = cache_as_is  
)
```



---

calc_ppm_diff	<i>Calculate ppm difference</i>
---------------	---------------------------------

---

### Description

Calculate ppm difference between two columns in an [annotation\\_table](#). e.g. for comparing observed m/z to theoretical ones.

### Usage

```
calc_ppm_diff(  
  obs_mz_column,  
  ref_mz_column,  
  out_column,  
  check_names = "unique",  
  ...  
)
```

### Arguments

`obs_mz_column` (character) Column name in `annotation_table` containing the observed m/z values.

`ref_mz_column` (character) Column name in annotation table containing the .

`out_column` (character) Column name in annotation table to store the computed ppm differences.

`check_names` (character) Check names. Allowed values are limited to the following:

- "stop": If the output column already exists an error will be thrown.
- "unique": If the output column already exists a unique column name will be generated.
- "replace": If the output column already exists it will be replaced.

The default is "unique".

... Additional slots and values passed to `struct_class`.

### Value

A `calc_ppm_diff` object with the following output slots:

`updated` (`annotation_table`) The input annotation source with the computed ppm differences in a new column.

### Inheritance

A `calc_ppm_diff` object inherits the following struct classes:

```
[calc_ppm_diff] -> [model] -> [struct_class]
```

**Examples**

```
M <- calc_ppm_diff(
  obs_mz_column = character(0),
  ref_mz_column = "reference (theoretical) m/z values.",
  out_column = character(0),
  check_names = "unique")
```

---

calc_rt_diff	<i>Calculate RT difference</i>
--------------	--------------------------------

---

**Description**

Calculate RT difference between two RT values

**Usage**

```
calc_rt_diff(
  obs_rt_column,
  ref_rt_column,
  out_column,
  check_names = "unique",
  ...
)
```

**Arguments**

obs_rt_column	(character) Column name in annotation table containing the observed (measured) RT values.
ref_rt_column	(character) Column name in annotation table containing the reference (theoretical) RT values.
out_column	(character) Column name in annotation table to store the computed RT differences.
check_names	(character) Check names. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "stop": If the output column already exists an error will be thrown.</li> <li>• "unique": If the output column already exists a unique column name will be generated.</li> <li>• "replace": If the output column already exists it will be replaced.</li> </ul> The default is "unique".
...	Additional slots and values passed to struct_class.

**Value**

A calc\_rt\_diff object with the following output slots:

updated	(annotation_table) The input annotation source with the newly generated column.
---------	---

**Inheritance**

A `calc_rt_diff` object inherits the following struct classes:

```
[calc_rt_diff] -> [model] -> [struct_class]
```

**Examples**

```
M <- calc_rt_diff(
  obs_rt_column = character(0),
  ref_rt_column = character(0),
  out_column = character(0),
  check_names = "unique")
```

---

cd_source	<i>LCMS table</i>
-----------	-------------------

---

**Description**

An LCMS table extends `annotation_table()` to represent annotation data for an LCMS experiment. Columns representing m/z and retention time are required for an `lcms_table`.

**Usage**

```
cd_source(
  source,
  sheets = c(1, 1),
  tag = "CD",
  mz_column = "mz",
  rt_column = "rt",
  id_column = "id",
  data = NULL,
  ...
)
```

**Arguments**

source	(character) The path to the Compound Discoverer Excel files to import. Both the compounds and isomers file should be included, in that order.
sheets	(character, numeric, integer) The name or index of the sheets to read from the source file(s). A sheet should be provided for each input file. The default is <code>c(1, 1)</code> .
tag	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is "CD".
mz_column	(character) The column name of the annotation data.frame containing m/z values. The default is "mz".
rt_column	(character) The column name of the annotation data.frame containing retention time values. The default is "rt".
id_column	(character) The column name of the annotation data.frame containing row identifiers. If NULL This will be generated automatically. The default is "id".
data	(data.frame, NULL) A data.frame of annotation data. The default is NULL.
...	Additional slots and values passed to <code>struct_class</code> .

**Value**

A `cd_source` object. This object has no output slots.

**Inheritance**

A `cd_source` object inherits the following struct classes:

```
[cd_source] -> [lcms_table] -> [annotation_table] -> [annotation_source] -> [struct_class]
```

**See Also**

Other annotation sources: [annotation\\_database](#), [annotation\\_table](#), [ls\\_source](#), [mspurity\\_source](#)

Other annotation tables: [annotation\\_table](#), [ls\\_source](#)

**Examples**

```
M <- cd_source(
  sheets = c(2, 2),
  mz_column = "mz",
  rt_column = "rt",
  id_column = "id",
  tag = character(0),
  data = data.frame(),
  source = character(0))
```

---

`chart_plot,annotation_bar_chart,annotation_source-method`  
*chart\_plot method*

---

**Description**

Plots a chart object

**Usage**

```
## S4 method for signature 'annotation_bar_chart,annotation_source'
chart_plot(obj, dobj)
```

```
## S4 method for signature 'annotation_histogram,annotation_source'
chart_plot(obj, dobj)
```

```
## S4 method for signature 'annotation_histogram2d,annotation_source'
chart_plot(obj, dobj)
```

```
## S4 method for signature 'annotation_pie_chart,annotation_source'
chart_plot(obj, dobj)
```

```
## S4 method for signature 'annotation_upset_chart,annotation_source'
chart_plot(obj, dobj, ...)
```

```
## S4 method for signature 'annotation_upset_chart,list'  
chart_plot(obj, dobj)  
  
## S4 method for signature 'annotation_venn_chart,annotation_source'  
chart_plot(obj, dobj, ...)  
  
## S4 method for signature 'annotation_venn_chart,list'  
chart_plot(obj, dobj)  
  
## S4 method for signature 'mwb_structure,annotation_source'  
chart_plot(obj, dobj)  
  
## S4 method for signature 'openbabel_structure,character'  
chart_plot(obj, dobj)  
  
## S4 method for signature 'openbabel_structure,annotation_source'  
chart_plot(obj, dobj)  
  
## S4 method for signature 'pubchem_structure,annotation_source'  
chart_plot(obj, dobj)  
  
## S4 method for signature 'pubchem_widget,annotation_source'  
chart_plot(obj, dobj)
```

### Arguments

obj	a chart object
dobj	a struct object
...	additional inputs to chart_plot

### Value

a plot object

### Examples

```
C <- example_chart()  
chart_plot(C, example_model())
```

---

check_for_columns	<i>Check for columns in an annotation_source</i>
-------------------	--

---

### Description

This method checks for the presence of columns by name in an [annotation\\_source\(\)](#). It returns TRUE if all are present, or a vector of messages indicating which columns are missing from the data.frame. It is used by MetMashR to ensure validity of certain objects.

### Usage

```
check_for_columns(obj, ..., msg = FALSE)

## S4 method for signature 'annotation_source'
check_for_columns(obj, ..., msg = FALSE)
```

### Arguments

obj	an <code>annotation_source()</code> object
...	the column names to check for
msg	TRUE/FALSE indicates whether to return a message if some columns are missing. If <code>msg = FALSE</code> then the function returns FALSE if all columns are not present.

### Value

logical if all columns are present, or a vector of messages if requested.

### Examples

```
# test if column present
AT <- annotation_source(data = data.frame(id = character(0)))
check_for_columns(AT, "id") # TRUE
check_for_columns(AT, "cake") # FALSE

# return a message if missing
check_for_columns(AT, "cake", msg = TRUE)
```

---

classyfire_lookup	<i>Query ClassyFire database</i>
-------------------	----------------------------------

---

### Description

Queries the ClassyFire database by inchikey to obtain chemical ontology information.

### Usage

```
classyfire_lookup(
  query_column,
  output_items = "kingdom",
  output_fields = "name",
  suffix = "_cf",
  ...
)
```

## Arguments

query_column	(character) The name of a column in the annotation table containing values to search in the api call.
output_items	(character) The names of the items to return from the results of the search. Can include any number of "kingdom", "superclass", "class", "subclass", "direct_parent", "intermediate_nodes", "substituents", "smiles", "molecular_framework", "description", "ancestors", "predicted_chebi_terms". Keyword ".all" may be used to return all items. The default is "kingdom".
output_fields	(character) The names of fields to return for each output_item. Can include any of "name", "description", "chemont_id" and "url". Keyword ".all" may be used to return all fields. Some items do not have fields, so output_category is ignored. The default is "name".
suffix	(character) A suffix appended to all column names in the returned result. The default is "_cf".
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- dplyr
- httr

## Value

A classyfire\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

## Inheritance

A classyfire\_lookup object inherits the following struct classes:

```
[classyfire_lookup] -> [rest_api] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

Wickham H (2023). *httr: Tools for Working with URLs and HTTP*. R package version 1.4.7, <https://CRAN.R-project.org/package=httr>.

## See Also

Other REST API's: [kegg\\_lookup](#), [lipidmaps\\_lookup](#), [mwb\\_compound\\_lookup](#), [rest\\_api](#)

**Examples**

```
M <- classifyfire_lookup(
  output_items = "kingdom",
  output_fields = "name",
  base_url = "http://classifyfire.wishartlab.com/entities",
  url_template = "<base_url>/<query_column>.json",
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

combine_columns	<i>Combine columns</i>
-----------------	------------------------

---

**Description**

A wrapper for `paste()` and `interaction()`. Combines the values in multiple columns row-wise.

**Usage**

```
combine_columns(
  column_names,
  separator = "_",
  prefix = NULL,
  suffix = NULL,
  output_column = "combined",
  clean = TRUE,
  ...
)
```

**Arguments**

column_names	(character) The column name(s) in the annotation_source to combine.
separator	(character) A string placed in between the two being joined. The default is "_".
prefix	(character, NULL) A string placed at the start of the combined strings. The default is NULL.
suffix	(character, NULL) A string placed at the end of the combined strings. The default is NULL.
output_column	(character) The name of a column to store the combined values in. The default is "combined".
clean	(logical) Clean old columns. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"TRUE": The named columns are removed after being combined.</li> <li>"FALSE": The named columns are retained after being combined.</li> </ul> The default is TRUE.
...	Additional slots and values passed to struct_class.



**Value**

A combine\_columns object with the following output slots:

updated (annotation\_source) The annotation\_source after combining the columns.

**Inheritance**

A combine\_columns object inherits the following struct classes:

[combine\_columns] -> [model] -> [struct\_class]

**Examples**

```
M <- combine_columns(
  column_names = "V1",
  separator = "_",
  output_column = "combined",
  clean = FALSE,
  prefix = NULL,
  suffix = NULL)
```

---

combine_records	<i>Combine annotation records (rows)</i>
-----------------	--

---

**Description**

Combine annotation records (rows) based on a key. All records with the same key will be combined. A number of helper functions are provided for common approaches to merging records.

**Usage**

```
combine_records(
  group_by,
  default_fcn = fuse(separator = " || "),
  fcns = list(),
  ...
)
```

**Arguments**

group_by	(character) The column used as the key for grouping records.
default_fcn	(function) The default function to use for summarising columns when combining records and a specific function has not been provided in fcns. The default is fuse(separator = "    ").
fcns	(list) A named list of functions to use for summarising named columns when combining records. Names should correspond to the columns in the annotation table. The default is list().
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- dplyr

## Value

A combine\_records object with the following output slots:

updated (annotation\_source) The input annotation source with the newly generated column.

## Inheritance

A combine\_records object inherits the following struct classes:

```
[combine_records] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

Lloyd GR, Jankevics A, Weber RJM (2020). "struct: an R/Bioconductor-based framework for standardized metabolomics data analysis and beyond." *Bioinformatics*, 36(22-23), 5551-5552.

## Examples

```
M <- combine_records(  
  fcns = list(),  
  group_by = character(0),  
  default_fcn = function({})
```

---

combine\_records\_helper\_functions  
*Combine records helper functions*

---

## Description

This page documents helper functions for use with `combine_records()`.

## Usage

```
compute_mode(ties = FALSE, na.rm = TRUE)
```

```
compute_mean(na.rm = TRUE)
```

```
compute_median(na.rm = TRUE)
```

```
fuse(separator, na_string = "NA")
```

```
select_max(max_col, use_abs = FALSE, keep_NA = FALSE)
```

```

select_min(min_col, use_abs = FALSE, keep_NA = FALSE)

select_match(match_col, search_col, separator, na_string = "NA")

select_exact(match_col, match, separator, na_string = "NA")

fuse_unique(
  separator,
  na_string = "NA",
  digits = 6,
  drop_na = FALSE,
  sort = FALSE
)

prioritise(match_col, priority, separator, no_match = NA, na_string = "NA")

nothing()

count_records()

select_grade(grade_col, keep_NA = FALSE, upper_case = TRUE)

```

### Arguments

ties	(logical) If TRUE then all records matching the tied groups are returned. Otherwise the first record is returned.
na.rm	(logical) If TRUE then NA is ignored
separator	(character, NULL) if !NULL this string is used to collapse matches with the same priority
na_string	(character) NA values are replaced with this string
max_col	(character) the column name to search for the maximum value.
use_abs	(logical) If TRUE then the sign of the values is ignored.
keep_NA	(logical) If TRUE keeps records with NA values
min_col	(character) the column name to search for the minimum value.
match_col	(character) the column with labels to prioritise
search_col	(character) the name of a column to use as a reference for locating values in the matching column.
match	(character) a value to search for in the matching column.
digits	(numeric) the number of digits to use when converting numerical values to characters when determining if values are unique.
drop_na	(logical) exclude NA from the list of unique entries
sort	(logical) sort the values before collapsing.
priority	(character) a list of labels in priority order
no_match	(character, NULL) if !NULL then annotations not matching any of the priority labels are replaced with this value
grade_col	(character) the name of a column containing grades
upper_case	(logical) If TRUE then grades are compared to upper case letters to determine their ordering, otherwise lower case.

**Value**

A function for use with `combine_records()`

**Functions**

- `compute_mode()`: returns the most common value, excluding NA. If `ties == TRUE` then all tied values are returned, otherwise the first value in a sorted unique list is returned (equal to min if numeric). If `na.rm = FALSE` then NA are included when searching for the modal value and placed last if `ties = FALSE` (values are returned preferentially over NA).
- `compute_mean()`: calculates the mean value, excluding NA if `na.rm = TRUE`
- `compute_median()`: calculates the median value, excluding NA if `na.rm = TRUE`
- `fuse()`: collapses multiple matching records into a single string using the provided separator.
- `select_max()`: selects a record based on the index of the maximum value in a another column.
- `select_min()`: selects a record based on the index of the minimum in a second column.
- `select_match()`: returns all records based on the indices of identical matches in a second column and collapses them using the provided separator.
- `select_exact()`: returns records based on the index of identical value matching the match parameter within the current column, and collapses them using the provided separator if necessary.
- `fuse_unique()`: collapses a set of records to a set of unique values using the provided separator. `digits` can be provided for numeric columns to control the precision used when determining unique values.
- `prioritise()`: reduces a set of annotations by prioritising values according to the input. If there are multiple matches with the same priority then they are collapsed using a separator.
- `nothing()`: a pass-through function to allow some annotation table columns to remain unchanged.
- `count_records()`: adds a new column indicating the number of annotations that match the given grouping variable.
- `select_grade()`: returns records based on the index of the best grade in a second list. The best grade is defined as "A" for `upper_case = TRUE` or "a" for `upper_case = FALSE` and the worst grade is "Z" or "z". Any non-exact matches to a character in `LETTERS` or `letters` are replaced with NA.

**Examples**

```
# Select matching records
M <- combine_records(
  group_by = "example",
  default_fcn = select_exact(
    match_col = "match_column",
    match = "find_me",
    separator = ", ",
    na_string = "NA"
  )
)

# Collapse unique values
M <- combine_records(
  group_by = "example",
  default_fcn = fuse_unique(
```

```
        digits = 6,
        separator = ", ",
        na_string = "NA",
        sort = FALSE
    )
)

# Prioritise by source
M <- combine_records(
  group_by = "InChiKey",
  default_fcn = prioritise(
    match_col = "source",
    priority = c("CD", "LS"),
    separator = " || "
  )
)

# Do nothing to all columns
M <- combine_records(
  group_by = "InChiKey",
  default_fcn = nothing()
)

# Add a column with the number of records with a matching inchikey
M <- combine_records(
  group_by = "InChiKey",
  fcns = list(
    count = count_records()
  )
)

# Select annotation with highest (best) grade
M <- combine_records(
  group_by = "InChiKey",
  default_fcn = select_grade(
    grade_col = "grade",
    keep_NA = FALSE,
    upper_case = TRUE
  )
)
```

---

combine\_sources

*Combine annotation sources (tables)*

---

### Description

Annotation tables are joined and matching columns merged.

### Usage

```
combine_sources(
  source_list,
  matching_columns = NULL,
  keep_cols = NULL,
```

```

source_col = "annotation_source",
exclude_cols = NULL,
tag = "combined",
as = annotation_source(name = "combined", description =
  paste0("A source created by combining two or ", "more sources")),
...
)

```

### Arguments

source_list	(list) A list of annotation sources to be combined.
matching_columns	(character, NULL) A named vector of columns names to be created by merging columns from individual sources. e.g. <code>c('hello'='world')</code> will rename the 'hello' column to 'world' if found in any of the tables. The default is NULL.
keep_cols	(character, NULL) A list of column names to keep in the combined table (padded with NA) if detected in one of the input tables. Special case ".all" will keep all columns from all tables. The default is NULL.
source_col	(character) The column name that will be created to contain a tag to indicate which source the annotation originated from. The default is "annotation_source".
exclude_cols	(NULL, character) Column names to be excluded from the merged annotation table. Note this is applied after keep_cols. The default is NULL.
tag	(character) The tag given to the newly combined table. The default is "combined".
as	(annotation_source) An annotation_source object to use as the base class for the combined sources. The default is <code>annotation_source(name = "combined", description = paste0("A source created by combining two or ", "more sources"))</code> .
...	Additional slots and values passed to struct_class.

### Value

A combine\_sources object with the following output slots:

combined_table	(annotation_source) The annotation tabel after combining the input tables.
----------------	--

### Inheritance

A combine\_sources object inherits the following struct classes:

```
[combine_sources] -> [model] -> [struct_class]
```

### Examples

```

M <- combine_sources(
  source_list = list(),
  matching_columns = NULL,
  keep_cols = NULL,
  source_col = "annotation_source",
  exclude_cols = NULL,
  tag = "combined",
  as = annotation_source())

```

---

CompoundDb\_source      *Import CompDB source*

---

### Description

Imports the compounds table of a CompDB source as an `annotation_source`.

### Usage

```
CompoundDb_source(source, tag = "cdb", ...)
```

### Arguments

source	(ANY) The source of annotation data.
tag	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is "cdb".
...	Additional slots and values passed to <code>struct_class</code> .

### Details

This object makes use of functionality from the following packages:

- CompoundDb

### Value

A `CompoundDb_source` object. This object has no output slots.

### Inheritance

A `CompoundDb_source` object inherits the following `struct` classes:

```
[CompoundDb_source] -> [annotation_source] -> [struct_class]
```

### References

Rainer J, Vicini A, Salzer L, Stanstrup J, Badia J, Neumann S, Stravs M, Verri Hernandez V, Gatto L, Gibb S, Witting M (2022). "A Modular and Expandable Ecosystem for Metabolomics Data Annotation in R." *Metabolites*, 12, 173. doi:10.3390/metabo12020173 <https://doi.org/10.3390/metabo12020173>, <https://www.mdpi.com/2218-1989/12/2/173>.

### Examples

```
M <- CompoundDb_source(  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

compute_column	<i>Compute a column</i>
----------------	-------------------------

---

### Description

Compute values for a new column based on an input column.

### Usage

```
compute_column(input_columns, output_column, fcn, ...)
```

### Arguments

`input_columns` (character) The name of a column in the input table used to compute a new column.

`output_column` (character) The name of the newly computed column.

`fcn` (function) The function used to compute the values for the new column.

`...` Additional slots and values passed to `struct_class`.

### Details

This object makes use of functionality from the following packages:

- `dplyr`

### Value

A `compute_column` object with the following output slots:

`updated` (annotation\_source) The updated annotations as an `annotation_source` object.

### Inheritance

A `compute_column` object inherits the following struct classes:

```
[compute_column] -> [model] -> [struct_class]
```

### References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

### Examples

```
M <- compute_column(  
  input_columns = character(0),  
  output_column = character(0),  
  fcn = function({})
```



---

compute_record	<i>Compute a value for a record</i>
----------------	-------------------------------------

---

### Description

Compute values for a record based on other values in a record

### Usage

```
compute_record(fcn, ...)
```

### Arguments

fcn (function) The function used to compute the values for the record.  
... Additional slots and values passed to `struct_class`.

### Details

This object makes use of functionality from the following packages:

- dplyr

### Value

A `compute_record` object with the following output slots:

updated (annotation\_source) The updated annotations as an `annotation_source` object.

### Inheritance

A `compute_record` object inherits the following struct classes:

```
[compute_record] -> [model] -> [struct_class]
```

### References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

### Examples

```
M <- compute_record(  
  fcn = function({})
```

---

database_lookup	<i>ID lookup by database</i>
-----------------	------------------------------

---

### Description

Search a database (`data.frame`) for annotation matches based on values in a specified column.

### Usage

```
database_lookup(
  query_column,
  database_column,
  database,
  include = NULL,
  suffix = NULL,
  not_found = NA,
  ...
)
```

### Arguments

<code>query_column</code>	(character) The annotation table column name to use as the reference for searching the database e.g. "HMBD_ID".
<code>database_column</code>	(character) The database column to search for matches to the values in <code>annotation_column</code> .
<code>database</code>	( <code>data.frame</code> , <code>annotation_database</code> ) A database to be searched. Can be a <code>data.frame</code> or a <code>annotation_database</code> object.
<code>include</code>	(character, <code>NULL</code> ) The name of the database columns to be added to the annotations. If <code>NULL</code> , all columns are retained. The default is <code>NULL</code> .
<code>suffix</code>	(character, <code>NULL</code> ) A string appended to the column names from the database. Used to distinguish columns from different databases with identical column names. If <code>suffix = NULL</code> then the column names are not changed. The default is <code>NULL</code> .
<code>not_found</code>	(character, numeric, logical, <code>NULL</code> ) The returned value when there are no matches. The default is <code>NA</code> .
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

### Details

This object makes use of functionality from the following packages:

- `dplyr`

### Value

A `database_lookup` object with the following output slots:

updated (annotation\_source) The input annotation\_source is updated with matching columns from the database.

### Inheritance

A database\_lookup object inherits the following struct classes:

```
[database_lookup] -> [model] -> [struct_class]
```

### References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

### Examples

```
M <- database_lookup(
  query_column = "V1",
  database_column = "",
  database = data.frame(),
  include = NULL,
  suffix = NULL,
  not_found = NULL)
```

---

eutils_lookup	<i>NCBI E-utils query</i>
---------------	---------------------------

---

### Description

Submit a query to one of the NCBI E-utils databases. See <https://www.ncbi.nlm.nih.gov/books/NBK25501/> for details.

### Usage

```
eutils_lookup(query_column, database, term, result_fields = "idlist", ...)
```

### Arguments

query_column	(character) The column name to use as the reference for searching the database e.g. "HMBD_ID".
database	(character) The name of the E-utils database to search. See <a href="https://www.ncbi.nlm.nih.gov/books/NBK25501/">https://www.ncbi.nlm.nih.gov/books/NBK25501/</a> for details.
term	(character) A correctly formatted search term to use with E-utils. See <a href="https://www.ncbi.nlm.nih.gov/books/NBK25501/">https://www.ncbi.nlm.nih.gov/books/NBK25501/</a> for details. When used with the provided url template will automatically include the value from the query_column at the beginning of the term.
result_fields	(character) The name of the search result field to return. For E-utils this is often "idlist". The default is "idlist".
...	Additional slots and values passed to struct_class.

**Value**

A eutils\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

**Inheritance**

A eutils\_lookup object inherits the following struct classes:

[eutils\_lookup] -> [rest\_api] -> [model] -> [struct\_class]

**Examples**

```
M <- eutils_lookup(
  database = "gene",
  term = "[pdat]",
  result_fields = "idlist",
  base_url = "https://eutils.ncbi.nlm.nih.gov/entrez/eutils",
  url_template = "<base_url>/esearch.fcgi?db=<database>&term=<query_column><term>&retmode=json",
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

excel\_database

*Excel database*

---

**Description**

A data.frame imported from the sheet of an excel file

**Usage**

```
excel_database(
  source = character(0),
  sheet = 1,
  rowNames = FALSE,
  colNames = TRUE,
  startRow = 1,
  ...
)
```

**Arguments**

source (ANY) The source of annotation data. The default is character(0).  
 sheet (character) The name of the sheet to import. The default is 1.

rowNames	(logical) If TRUE, first column of data will be used as row names. The default is FALSE.
colNames	(logical) If TRUE, first row of data will be used as column names. The default is TRUE.
startRow	(numeric, integer) First row to begin looking for data. Empty rows at the top of a file are always skipped, regardless of the value of startRow. The default is 1.
...	Additional slots and values passed to struct_class.

### Details

This object makes use of functionality from the following packages:

- openxlsx

### Value

A excel\_database object. This object has no output slots.

### Inheritance

A excel\_database object inherits the following struct classes:

[excel\_database] -> [annotation\_database] -> [annotation\_source] -> [struct\_class]

### References

Schauberger P, Walker A (2023). *openxlsx: Read, Write and Edit xlsx Files*. R package version 4.2.5.2, <https://CRAN.R-project.org/package=openxlsx>.

### See Also

Other annotation databases: [AnnotationDb\\_database](#), [GO\\_database](#), [annotation\\_database](#), [annotation\\_source](#), [rdata\\_database](#), [rds\\_cache](#), [rds\\_database](#)

### Examples

```
M <- excel_database(  
  sheet = character(0),  
  rowNames = FALSE,  
  colNames = FALSE,  
  startRow = 1,  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

filter_labels	<i>Filter by factor labels</i>
---------------	--------------------------------

---

### Description

Removes (or includes) annotations such that the named column excludes (or includes) the specified labels.

### Usage

```
filter_labels(
  column_name,
  labels,
  mode = "exclude",
  perl = FALSE,
  fixed = FALSE,
  match_na = FALSE,
  ...
)
```

### Arguments

column_name	(character) The column name to filter.
labels	(character) The labels to filter by. Uses <code>[grep1()]</code> so regex is accepted e.g. for partial matching or labels.
mode	(character) Filter mode. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"exclude": The specified labels are removed from the annotation table.</li> <li>"include": Only the specified labels are retained in the annotation table.</li> </ul> The default is "exclude".
perl	(logical) Use a Perl-compatible regex. The default is FALSE.
fixed	(logical) Use exact matching. The default is FALSE.
match_na	(logical) Match NA. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"TRUE": NA values will be treated as if they matched to one of the labels.</li> <li>"FALSE": NA values will be treated as though they did not match to any of the labels.</li> </ul> The default is FALSE.
...	Additional slots and values passed to <code>struct_class</code> .

### Value

A `filter_labels` object with the following output slots:

filtered	(annotation_source) The annotation_source after filtering.
flags	(data.frame) A list of flags indicating which annotations had a matching label.

**Inheritance**

A filter\_labels object inherits the following struct classes:

```
[filter_labels] -> [model] -> [struct_class]
```

**Examples**

```
M <- filter_labels(
  column_name = "V1",
  labels = "",
  mode = "exclude",
  perl = FALSE,
  fixed = FALSE,
  match_na = FALSE)
```

---

filter_na	<i>Filter by missing values</i>
-----------	---------------------------------

---

**Description**

Filters annotations where the named column is NA

**Usage**

```
filter_na(column_name, mode = "exclude", ...)
```

**Arguments**

column_name	(character) The column name to use for filtering.
mode	(character) Filter mode. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "include": Rows with NA are kept and all others removed.</li> <li>• "exclude": Rows with NA are excluded and all other kept.</li> </ul> The default is "exclude".
...	Additional slots and values passed to struct_class.

**Value**

A filter\_na object with the following output slots:

filtered	(annotation_source) Annotation_source after filtering.
flags	(data.frame) A list of flags indicating which annotations were removed.

**Inheritance**

A filter\_na object inherits the following struct classes:

```
[filter_na] -> [model] -> [struct_class]
```

**Examples**

```
M <- filter_na(
  column_name = "V1",
  mode = "exclude")
```

---

filter_range	<i>Filter by range</i>
--------------	------------------------

---

**Description**

Removes annotations where the names column is greater than an upper limit or less than a lower limit.

**Usage**

```
filter_range(
  column_name,
  upper_limit = Inf,
  lower_limit = -Inf,
  equal_to = TRUE,
  ...
)
```

**Arguments**

column_name	(character) The column name to filter.
upper_limit	(numeric, integer, function) The upper limit used for filtering. Can be a value, or a function that computes a value (e.g. mean). The default is Inf.
lower_limit	(numeric, integer, function) The lower limit used for filtering. Can be a value, or a function that computes a value (e.g. mean). The default is -Inf.
equal_to	(logical) Equal to limits. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"TRUE": Greater/less than or equal to the limits are excluded.</li> <li>"FALSE": Greater/less than the limits are excluded.</li> </ul> The default is TRUE.
...	Additional slots and values passed to struct_class.

**Value**

A filter\_range object with the following output slots:

filtered	(annotation_source) Annotation_source after filtering.
flags	(data.frame) A list of flags indicating which annotations were removed.



**Inheritance**

A filter\_range object inherits the following struct classes:

```
[filter_range] -> [model] -> [struct_class]
```

**Examples**

```
M <- filter_range(
  column_name = "V1",
  upper_limit = Inf,
  lower_limit = -Inf,
  equal_to = FALSE)
```

---

filter_records	<i>Filter rows</i>
----------------	--------------------

---

**Description**

A wrapper around `dplyr::filter`. Select rows from an annotation table using tidy grammar.

**Usage**

```
filter_records(where = wherever(A > 0), ...)
```

**Arguments**

where	(quosures) A list of <code>rlang::quosure</code> for evaluation e.g. <code>A&gt;10</code> will select all rows where the values in column A are greater than 10. A helper function <code>wherever</code> is provided to generate a suitable list of quosures. The default is <code>wherever(A &gt; 0)</code> .
...	Additional slots and values passed to <code>struct_class</code> .

**Details**

This object makes use of functionality from the following packages:

- dplyr
- rlang

**Value**

A filter\_records object with the following output slots:

updated (annotation\_source) The updated annotations as an annotation\_source object.

**Inheritance**

A filter\_records object inherits the following struct classes:

```
[filter_records] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

Henry L, Wickham H (2024). *rlang: Functions for Base Types and Core R and 'Tidyverse' Features*. R package version 1.1.3, <https://CRAN.R-project.org/package=rlang>.

## See Also

`dplyr::filter()`  
`wherever()`

## Examples

```
M <- filter_records(
  where = wherever(A>10))
```

---

filter_venn	<i>Filter by factor levels</i>
-------------	--------------------------------

---

## Description

Removes (or includes) annotations such that the named column excludes (or includes) the specified levels.

## Usage

```
filter_venn(
  factor_name,
  group_column = NULL,
  tables = NULL,
  levels,
  mode = "exclude",
  perl = FALSE,
  fixed = FALSE,
  ...
)
```

## Arguments

factor_name	(character) The name of the column(s) in the <code>annotation_source</code> to generate a chart from. Up to seven columns can be compared for a single <code>annotation_source</code> .
group_column	(character, NULL) The name of the column in the <code>annotation_source</code> to create groups from in the Venn diagram. This parameter is ignored if <code>!is.null(tables)</code> , as each table is considered to be a group. This parameter is also ignored if more than one <code>factor_name</code> is provided, as each column is considered a group. The default is NULL.
tables	(list, NULL) A list of <code>annotation_sources</code> to generate the venn groups from. If the only table of interest is the table coming in from <code>model_apply</code> then set <code>tables = NULL</code> and use <code>group_column</code> . The default is NULL.

levels	(character) The venn diagram levels to filter by.
mode	(character) Filter mode. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "exclude": The specified levels are removed from the annotation table.</li> <li>• "include": Only the specified levels are retained in the annotation table.</li> </ul> The default is "exclude".
perl	(logical) Use a Perl-compatible regex. The default is FALSE.
fixed	(logical) Use exact matching. The default is FALSE.
...	Additional slots and values passed to struct_class.

### Value

A filter\_venn object with the following output slots:

filtered	(annotation_source) Annotation_source after filtering.
flags	(data.frame) A list of flags indicating which annotations were removed.

### Inheritance

A filter\_venn object inherits the following struct classes:

```
[filter_venn] -> [model] -> [struct_class]
```

### Examples

```
M <- filter_venn(
  factor_name = "V1",
  group_column = NULL,
  tables = NULL,
  levels = "",
  mode = "exclude",
  perl = FALSE,
  fixed = FALSE)
```

---

github\_file

*GitHub file*

---

### Description

Uses the GitHub REST API to retrieve a file from a specified GitHub repository.

**Usage**

```
github_file(
  username,
  repository_name,
  file_path,
  bfc_path = NULL,
  resource_name = paste(username, repository_name, file_path, sep = "_"),
  ...
)
```

**Arguments**

username	(character) The GitHub username to retrieve the file from.
repository_name	(character) The name of a repository for the specified GitHub username that contains the file to download.
file_path	(character) The path to the file to download within the specified GitHub repository.
bfc_path	(character, NULL) BiocFileCache is used to cache the database locally and prevent unnecessary downloads. If a path is provided then BiocFileCache will use this location. If NULL it will use the default location (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is NULL.
resource_name	(character) The name given to this resource in the cache. (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is <code>paste(username, repository_name, file_path, sep = "_")</code> .
...	Additional slots and values passed to <code>struct_class</code> .

**Details**

This object makes use of functionality from the following packages:

- BiocFileCache
- httr

**Value**

A `github_file` object. This object has no output slots.

**Inheritance**

A `github_file` object inherits the following struct classes:

```
[github_file] -> [BiocFileCache_database] -> [annotation_database] -> [annotation_source]
-> [struct_class]
```

**References**

Shepherd L, Morgan M (2024). *BiocFileCache: Manage Files Across Sessions*. R package version 2.10.2.

Wickham H (2023). *httr: Tools for Working with URLs and HTTP*. R package version 1.4.7, <https://CRAN.R-project.org/package=httr>.

**Examples**

```
M <- github_file(
  username = character(),
  repository_name = character(),
  file_path = character(),
  bfc_path = NULL,
  resource_name = "bfc",
  bfc_fun = function() {},
  import_fun = function() {},
  offline = FALSE,
  tag = character(),
  data = data.frame(),
  source = "ANY")
```

---

GO\_database

*GO.db*


---

**Description**

Retrieve a table from the Gene Ontology using the GO.db package.

**Usage**

```
GO_database(source = "GO.db", table = "GOBP OFFSPRING", ...)
```

**Arguments**

source	(character) The name of an AnnotationDb package to import the specified table from. Note the package should already be installed. The default is "GO.db".
table	(character) The name of a table to import from the GO.db package. Allowed tables include: GOBPANCESTOR, GOBPARENTS, GOBPCHILDREN, GOBP OFFSPRING (and their CC or MF equivalents), GOTERM, GOSYNONYM, GOOBSOLETE. The default is "GOBP OFFSPRING".
...	Additional slots and values passed to struct_class.

**Details**

This object makes use of functionality from the following packages:

- GO.db

**Value**

A GO\_database object. This object has no output slots.

**Inheritance**

A GO\_database object inherits the following struct classes:

```
[GO_database] -> [AnnotationDb_database] -> [annotation_database] -> [annotation_source]
-> [struct_class]
```

## References

Carlson M (2023). *GO.db: A set of annotation maps describing the entire Gene Ontology*. R package version 3.18.0.

Pagès H, Carlson M, Falcon S, Li N (2023). *AnnotationDbi: Manipulation of SQLite-based annotations in Bioconductor*. doi:10.18129/B9.bioc.AnnotationDbi <https://doi.org/10.18129/B9.bioc.AnnotationDbi>, R package version 1.64.1, <https://bioconductor.org/packages/AnnotationDbi>.

## See Also

[GO.db::GO\(\)](#)

Other annotation databases: [AnnotationDb\\_database](#), [annotation\\_database](#), [annotation\\_source](#), [excel\\_database](#), [rdata\\_database](#), [rds\\_cache](#), [rds\\_database](#)

## Examples

```
M <- GO_database(  
  table = "GOBPCHILDREN",  
  tag = character(0),  
  data = data.frame(),  
  source = character(0))
```

---

greek_dictionary	<i>Greek dictionary</i>
------------------	-------------------------

---

## Description

A dictionary for converting Greek characters to Romanised names. It is intended for use with the [normalise\\_strings\(\)](#) object.

## Usage

```
greek_dictionary
```

## Format

An object of class `list` of length 48.

## Value

A dictionary for use with [normalise\\_strings\(\)](#)

## Examples

```
M <- normalise_strings(  
  search_column = "example",  
  output_column = "result",  
  dictionary = greek_dictionary  
)
```

---

hmdb_lookup	<i>Compound ID lookup via pubchem</i>
-------------	---------------------------------------

---

### Description

Requests HMDB records based on HMDB identifiers.

### Usage

```
hmdb_lookup(query_column, suffix = "_hmdb", output = "inchikey", ...)
```

### Arguments

query_column	(character) The name of a column in the annotation table containing values to search in the api call.
suffix	(character) A suffix appended to all column names in the returned result. The default is "_hmdb".
output	(character) The value returned from the HMDB xml. The default is "inchikey".
...	Additional slots and values passed to struct_class.

### Details

This object makes use of functionality from the following packages:

- XML

### Value

A hmdb\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

### Inheritance

A hmdb\_lookup object inherits the following struct classes:

```
[hmdb_lookup] -> [rest_api] -> [model] -> [struct_class]
```

### References

Temple Lang D (2024). *XML: Tools for Parsing and Generating XML Within R and S-Plus*. R package version 3.99-0.16.1, <https://CRAN.R-project.org/package=XML>.

**Examples**

```
M <- hmdb_lookup(
  output = "inchikey",
  base_url = "http://www.hmdb.ca/metabolites",
  url_template = "<base_url>/<query_column>.xml",
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

id\_counts

*id counts*


---

**Description**

Adds the number of times an identical identifier is present to each record.

**Usage**

```
id_counts(id_column, count_column = "id_counts", count_na = TRUE, ...)
```

**Arguments**

**id\_column** (character) Column name of the variable ids in variable\_meta.

**count\_column** (character) The name of the new column to store the counts in. The default is "id\_counts".

**count\_na** (logical) Count NA. Allowed values are limited to the following:

- "TRUE": Report number of NA.
- "FALSE": Do not report number of NA.

The default is TRUE.

**...** Additional slots and values passed to struct\_class.

**Value**

A id\_counts object with the following output slots:

**updated** (annotation\_source) The input annotation source with the newly generated column.

**Inheritance**

A id\_counts object inherits the following struct classes:

```
[id_counts] -> [model] -> [struct_class]
```



**Examples**

```
M <- id_counts(  
  id_column = character(0),  
  count_column = character(0),  
  count_na = FALSE)
```

---

import_source	<i>Import_source</i>
---------------	----------------------

---

**Description**

A wrapper for [read\\_source\(\)](#) that can be used in an annotation workflow to import an annotation source.

**Usage**

```
import_source(...)
```

**Arguments**

... Additional slots and values passed to `struct_class`.

**Value**

A `import_source` object with the following output slots:

`imported` (`annotation_source`) The `annotation_source` after importing the data.

**Inheritance**

A `import_source` object inherits the following struct classes:

```
[import_source] -> [model] -> [struct_class]
```

**Examples**

```
M <- import_source()
```

---

is_writable	<i>Is database writable</i>
-------------	-----------------------------

---

**Description**

A function that returns TRUE if the database has been designed for use in read and write mode.

**Usage**

```
is_writable(obj, ...)  
  
## S4 method for signature 'annotation_database'  
is_writable(obj)  
  
## S4 method for signature 'rdata_database'  
is_writable(obj)
```

**Arguments**

obj	A annotation_database object
...	additional database specific inputs

**Value**

TRUE if the database is writable; FALSE otherwise. This method does not check file properties, only the intended usage of the object.

**Examples**

```
M <- annotation_database()  
is_writable(M)
```

---

kegg_lookup	<i>Convert to or from kegg identifiers</i>
-------------	--

---

**Description**

Searches the Kegg database to obtain external identifiers. KEGG compound, drug and glycan databases can be queried for pubchem and chebi identifiers, and vice-versa.

**Usage**

```
kegg_lookup(  
  get = "pubchem",  
  from = "compound",  
  query_column,  
  suffix = "_kegg",  
  ...  
)
```

**Arguments**

get	(character) Get identifier. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "compound": KEGG small molecule database.</li> <li>• "glycan": KEGG glycan database.</li> <li>• "drug": KEGG drug database.</li> <li>• "chebi": Chemical Entities of Biological Interest (ChEBI) database.</li> <li>• "pubchem": PubChem Substance Identifier.</li> </ul> The default is "pubchem".
from	(character) From identifier. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "compound": KEGG small molecule database.</li> <li>• "glycan": KEGG glycan database.</li> <li>• "drug": KEGG drug database.</li> <li>• "chebi": Chemical Entities of Biological Interest (ChEBI) database.</li> <li>• "pubchem": PubChem Substance Identifier.</li> </ul> The default is "compound".
query_column	(character) The name of the column containing identifiers to search the database for. They should be identifiers of the type selected for the "from" slot.
suffix	(character) A suffix appended to all column names in the returned result. The default is "_kegg".
...	Additional slots and values passed to <code>struct_class</code> .

**Details**

This object makes use of functionality from the following packages:

- KEGGREST
- dplyr

**Value**

A `kegg_lookup` object with the following output slots:

`updated` (`annotation_source`) An `annotation_source` object with a new column of compound identifiers.

**Inheritance**

A `kegg_lookup` object inherits the following struct classes:

```
[kegg_lookup] -> [model] -> [struct_class]
```

**References**

Tenenbaum D, Maintainer B (2023). *KEGGREST: Client-side REST access to the Kyoto Encyclopedia of Genes and Genomes (KEGG)*. doi:10.18129/B9.bioc.KEGGREST <https://doi.org/10.18129/B9.bioc.KEGGREST>, R package version 1.42.0, <https://bioconductor.org/packages/KEGGREST>.

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

**See Also**

Other REST API's: [classifyfire\\_lookup](#), [lipidmaps\\_lookup](#), [mwb\\_compound\\_lookup](#), [rest\\_api](#)

**Examples**

```
M <- kegg_lookup(
  get = "pubchem",
  from = "compound",
  query_column = "V1",
  suffix = "_kegg")
```

---

lcms_table	<i>LCMS table</i>
------------	-------------------

---

**Description**

An LCMS table extends [annotation\\_table\(\)](#) to represent annotation data for an LCMS experiment. Columns representing m/z and retention time are required for an lcms\_table.

**Usage**

```
lcms_table(
  data = NULL,
  tag = "",
  id_column = "id",
  mz_column = "mz",
  rt_column = "rt",
  ...
)
```

**Arguments**

data	(data.frame, NULL) A data.frame of annotation data. The default is NULL.
tag	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is "".
id_column	(character) The column name of the annotation data.frame containing row identifiers. If NULL This will be generated automatically. The default is "id".
mz_column	(character) The column name of the annotation data.frame containing m/z values. The default is "mz".
rt_column	(character) The column name of the annotation data.frame containing retention time values. The default is "rt".
...	Additional slots and values passed to struct_class.

**Value**

A lcms\_table object. This object has no output slots.

**Inheritance**

A `lcms_table` object inherits the following struct classes:

```
[lcms_table] -> [annotation_table] -> [annotation_source] -> [struct_class]
```

**Examples**

```
M <- lcms_table(
  mz_column = "mz",
  rt_column = "rt",
  id_column = "id",
  tag = character(0),
  data = data.frame(),
  source = "ANY")
```

---

lipidmaps_lookup	<i>LipidMaps api lookup</i>
------------------	-----------------------------

---

**Description**

Search the LipidMaps database using the API

**Usage**

```
lipidmaps_lookup(
  query_column,
  context,
  context_item,
  output_item = "all",
  suffix = "_lipidmaps",
  ...
)
```

**Arguments**

<code>query_column</code>	(character) The name of a column in the annotation table containing values to search in the api call.
<code>context</code>	(character) The search API context. Must be one of "compound", "gene", or "protein".
<code>context_item</code>	(character) The context item being searched. See <a href="https://lipidmaps.org/resources/rest">https://lipidmaps.org/resources/rest</a> for details.
<code>output_item</code>	(character) The names of the columns to return from the results of the search. See <a href="https://lipidmaps.org/resources/rest">https://lipidmaps.org/resources/rest</a> for details. The default is "all".
<code>suffix</code>	(character) A suffix appended to all column names in the returned result. The default is "_lipidmaps".
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

**Value**

A lipidmaps\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

**Inheritance**

A lipidmaps\_lookup object inherits the following struct classes:

[lipidmaps\_lookup] -> [rest\_api] -> [model] -> [struct\_class]

**See Also**

Other REST API's: [classyfire\\_lookup](#), [kegg\\_lookup](#), [mwb\\_compound\\_lookup](#), [rest\\_api](#)

**Examples**

```
M <- lipidmaps_lookup(
  query_column = character(0),
  output_item = "input",
  context = "compound",
  context_item = character(0),
  base_url = "https://www.lipidmaps.org/rest",
  url_template = "<base_url>/<context>/<context_item>/<query_column>/<output_item>/json",
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

ls\_source

*LCMS table*

---

**Description**

An LCMS table extends [annotation\\_table\(\)](#) to represent annotation data for an LCMS experiment. Columns representing m/z and retention time are required for an lcms\_table.

**Usage**

```
ls_source(
  source,
  tag = "LS",
  mz_column = "mz",
  rt_column = "rt",
  id_column = "id",
  data = NULL,
  ...
)
```

## Arguments

source	(ANY) The source of annotation data.
tag	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is "LS".
mz_column	(character) The column name of the annotation data.frame containing m/z values. The default is "mz".
rt_column	(character) The column name of the annotation data.frame containing retention time values. The default is "rt".
id_column	(character) The column name of the annotation data.frame containing row identifiers. If NULL This will be generated automatically. The default is "id".
data	(data.frame, NULL) A data.frame of annotation data. The default is NULL.
...	Additional slots and values passed to struct_class.

## Value

A ls\_source object. This object has no output slots.

## Inheritance

A ls\_source object inherits the following struct classes:

```
[ls_source] -> [lcms_table] -> [annotation_table] -> [annotation_source] -> [struct_class]
```

## See Also

Other annotation sources: [annotation\\_database](#), [annotation\\_table](#), [cd\\_source](#), [mspurity\\_source](#)

Other annotation tables: [annotation\\_table](#), [cd\\_source](#)

## Examples

```
M <- ls_source(  
  mz_column = "mz",  
  rt_column = "rt",  
  id_column = "id",  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

model\_apply,model,annotation\_source-method

*Apply method*

---

## Description

Applies method to the input DatasetExperiment

**Usage**

```
## S4 method for signature 'model,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'model,list'  
model_apply(M, D)  
  
## S4 method for signature 'model_seq,list'  
model_apply(M, D)  
  
## S4 method for signature 'model_seq,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'AnnotationDb_select,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'CompoundDb_source,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'add_columns,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'add_labels,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'calc_ppm_diff,annotation_table'  
model_apply(M, D)  
  
## S4 method for signature 'calc_rt_diff,annotation_table'  
model_apply(M, D)  
  
## S4 method for signature 'rest_api,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'combine_columns,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'combine_records,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'combine_sources,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'combine_sources,list'  
model_apply(M, D)  
  
## S4 method for signature 'compute_column,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'compute_record,annotation_source'  
model_apply(M, D)
```



```
## S4 method for signature 'database_lookup,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'split_records,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'filter_labels,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'filter_na,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'filter_range,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'filter_records,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'filter_venn,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'id_counts,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'import_source,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'kegg_lookup,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'mspurity_source,lcms_table'  
model_apply(M, D)  
  
## S4 method for signature 'mz_match,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'mzrt_match,lcms_table'  
model_apply(M, D)  
  
## S4 method for signature 'normalise_lipids,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'normalise_strings,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'pivot_columns,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'prioritise_columns,annotation_source'  
model_apply(M, D)  
  
## S4 method for signature 'remove_columns,annotation_source'
```

```

model_apply(M, D)

## S4 method for signature 'rename_columns,annotation_source'
model_apply(M, D)

## S4 method for signature 'rt_match,annotation_table'
model_apply(M, D)

## S4 method for signature 'select_columns,annotation_source'
model_apply(M, D)

## S4 method for signature 'split_column,annotation_source'
model_apply(M, D)

## S4 method for signature 'trim_whitespace,annotation_source'
model_apply(M, D)

## S4 method for signature 'unique_records,annotation_source'
model_apply(M, D)

```

### Arguments

M	a method object
D	another object used by the first

### Value

Returns a modified method object

### Examples

```

M <- example_model()
M <- model_apply(M, iris_DatasetExperiment())

```

---

mspurity_source	<i>msPurity source</i>
-----------------	------------------------

---

### Description

An annotation source for importing an annotation table from the format created by the msPurity package.

### Usage

```
mspurity_source(source, tag = "msPurity", ...)
```

### Arguments

source	(ANY) The source of annotation data.
tag	(character) A (short) character string that is used to represent this source e.g. in column names or source columns when used in a workflow. The default is "msPurity".
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- msPurity

## Value

A `mspurity_source` object. This object has no output slots.

## Inheritance

A `mspurity_source` object inherits the following struct classes:

```
[mspurity_source] -> [annotation_source] -> [struct_class]
```

## References

Lawson, Nigel T, Weber, M. RJ, Jones, R. M, Chetwynd, J. A, Blanco R, Alejandro G, Guida D, Riccardo, Viant, R. M, Dunn, B W (2017). "msPurity: Automated Evaluation of Precursor Ion Purity for Mass Spectrometry-Based Fragmentation in Metabolomics." *Analytical Chemistry*, 89, 2432-2439. doi:10.1021/acs.analchem.6b04358 <https://doi.org/10.1021/acs.analchem.6b04358>.

## See Also

Other annotation sources: [annotation\\_database](#), [annotation\\_table](#), [cd\\_source](#), [ls\\_source](#)

## Examples

```
M <- mspurity_source(  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

MTox700plus\_database    *MTox700plus\_database*

---

## Description

Imports the MTox700+ database, which is made available under the ODC Attribution License. MTox700+ is a list of toxicologically relevant metabolites derived from publications, public databases and relevant toxicological assays.

## Usage

```
MTox700plus_database(  
  version = "latest",  
  bfc_path = NULL,  
  resource_name = "MetMashR_MTox700plus",  
  ...  
)
```

**Arguments**

version	(character) The version number of the MTox700+ database to import. Available versions are listed <a href="#">here</a> . version should match the tag of the release e.g. "v1.0". For convenience version = "latest" will always retrieve the most recent release. To prevent unnecessary downloads BiocFileCache is used to store a local copy. The default is "latest".
bfc_path	(character, NULL) BiocFileCache is used to cache the database locally and prevent unnecessary downloads. If a path is provided then BiocFileCache will use this location. If NULL it will use the default location (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is NULL.
resource_name	(character) The name given to this resource in the cache. (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is "MetMashR_MTox700plus".
...	Additional slots and values passed to struct_class.

**Details**

This object makes use of functionality from the following packages:

- BiocFileCache
- httr

**Value**

A MTox700plus\_database object. This object has no output slots.

**Inheritance**

A MTox700plus\_database object inherits the following struct classes:

```
[MTox700plus_database] -> [BiocFileCache_database] -> [annotation_database] -> [annotation_source]
-> [struct_class]
```

**References**

Shepherd L, Morgan M (2024). *BiocFileCache: Manage Files Across Sessions*. R package version 2.10.2.

Wickham H (2023). *httr: Tools for Working with URLs and HTTP*. R package version 1.4.7, <https://CRAN.R-project.org/package=httr>.

Sostare E, Lawson TN, Saunders LR, Colbourne JK, Weber RJM, Sobanski T, Viant MR (2022). "Knowledge-Driven Approaches to Create the MTox700+ Metabolite Panel for Predicting Toxicity." *Toxicological Sciences*, 186, 208-220. doi:10.1093/toxsci/kfac007 <https://doi.org/10.1093/toxsci/kfac007>.

**Examples**

```
M <- MTox700plus_database(
  version = "v1.0",
  bfc_path = NULL,
  resource_name = "bfc",
  bfc_fun = function(){},
  import_fun = function(){},
  offline = FALSE,
```

```

tag = character(0),
data = data.frame(),
source = "ANY")

```

---

mwb\_compound\_lookup     *Convert to/from kegg identifiers*

---

## Description

Searches MetabolomicsWorkbench for compound identifiers.

## Usage

```

mwb_compound_lookup(
  input_item = "inchi_key",
  query_column,
  output_item = "pubchem_id",
  suffix = "_mwb",
  ...
)

```

## Arguments

input_item	(character) A valid input item for the compound context (see <a href="https://www.metabolomicsworkbench.org">https://www.metabolomicsworkbench.org</a> ). The values in the query_column should be of this type. The default is "inchi_key".
query_column	(character) The name of a column in the annotation table containing values to search in the api call.
output_item	(character) A comma separated list of Valid output items for the compound context (see <a href="https://www.metabolomicsworkbench.org/tools/mw_rest.php">https://www.metabolomicsworkbench.org/tools/mw_rest.php</a> ). The default is "pubchem_id".
suffix	(character) A suffix appended to all column names in the returned result. The default is "_mwb".
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- metabolomicsWorkbenchR
- dplyr

## Value

A mwb\_compound\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

## Inheritance

A `mwb_compound_lookup` object inherits the following struct classes:

```
[mwb_compound_lookup] -> [rest_api] -> [model] -> [struct_class]
```

## References

Lloyd GR, Weber RJM (???) *metabolomicsWorkbenchR: Metabolomics Workbench in R*. R package version 1.14.1.

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

## See Also

Other REST API's: [classyfire\\_lookup](#), [kegg\\_lookup](#), [lipidmaps\\_lookup](#), [rest\\_api](#)

## Examples

```
M <- mwb_compound_lookup(  
  input_item = "inchi_key",  
  output_item = "inchi_key",  
  base_url = "https://www.metabolomicsworkbench.org/rest",  
  url_template = "<base_url>/compound/<input_item>/<query_column>/<output_item>",  
  query_column = character(0),  
  cache = NULL,  
  status_codes = list(),  
  delay = 0.5,  
  suffix = "_rest_api")
```

---

mwb\_refmet\_database    *mwb\_refmet\_database*

---

## Description

Imports the Metabolomics Workbench refmet database.

## Usage

```
mwb_refmet_database(bfc = NULL, ...)
```

## Arguments

`bfc` (character) BiocFileCache is used to cache database locally and prevent unnecessary downloads. If a path is provided then BiocFileCache will use this location. If NULL it will use the default location (see [BiocFileCache::BiocFileCache](#) for details). The default is NULL.

`...` Additional slots and values passed to `struct_class`.

## Details

This object makes use of functionality from the following packages:

- BiocFileCache
- httr
- plyr

## Value

A `mwb_refmet_database` object. This object has no output slots.

## Inheritance

A `mwb_refmet_database` object inherits the following struct classes:

```
[mwb_refmet_database] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

## References

Shepherd L, Morgan M (2024). *BiocFileCache: Manage Files Across Sessions*. R package version 2.10.2.

Wickham H (2023). *httr: Tools for Working with URLs and HTTP*. R package version 1.4.7, <https://CRAN.R-project.org/package=httr>.

Wickham H (2011). "The Split-Apply-Combine Strategy for Data Analysis." *Journal of Statistical Software*, 40(1), 1-29. <https://www.jstatsoft.org/v40/i01/>.

## Examples

```
M <- mwb_refmet_database(  
  bfc = character(0),  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

mwb\_structure

*MWB molecular structure*

---

## Description

Query the Metabolomic Workbench API and retrieve a display an image of the matching molecular structure.

## Usage

```
mwb_structure(query_column, row_index, ...)
```

## Arguments

query_column	(character) The name of the annotation_source column with regno compound identifiers.
row_index	(integer, numeric) The row index of the annotation_source to request an image of the molecular structure of.
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- cowplot
- metabolomicsWorkbenchR

This object queries the Metabolomics Workbench API for matches to your query without caching the results. It is therefore intended for limited use. If you wish to obtain images for a large number of molecules you should seek an alternative solution.

## Value

A `mwb_structure` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `mwb_structure` object inherits the following struct classes:

```
[mwb_structure] -> [chart] -> [struct_class]
```

## References

Wilke C (2024). *cowplot: Streamlined Plot Theme and Plot Annotations for 'ggplot2'*. R package version 1.1.3, <https://CRAN.R-project.org/package=cowplot>.

Lloyd GR, Weber RJM (????). *metabolomicsWorkbenchR: Metabolomics Workbench in R*. R package version 1.14.1.

## Examples

```
M <- mwb_structure(  
  row_index = 1,  
  query_column = "V1")
```



---

mzrt_match	<i>mz matching</i>
------------	--------------------

---

### Description

Annotations will be matched to the measured data variable meta data.frame by determining which annotations ppm AND rt windows overlap with the ppm AND rt windows of the measured mz.

### Usage

```
mzrt_match(
  variable_meta,
  mz_column,
  rt_column,
  ppm_window,
  rt_window,
  id_column,
  ...
)
```

### Arguments

variable_meta	(data.frame) A data.frame of variable IDs and their corresponding mz values.
mz_column	(character) Column name of the mz values in variable_meta.
rt_column	(character) Column name of the rt values in variable_meta.
ppm_window	(numeric, integer) Ppm window to use for matching. If a single value is provided then the same ppm is used for both variable meta and the annotations. A named vector can also be provided e.g. c("variable_meta"=5,"annotations"=2) to use different " , "windows for each data table.
rt_window	(numeric, integer) Rt window to use for matching. If a single value is provided then the same rt is used for both variable meta and the annotations. A named vector can also be provided e.g. c("variable_meta"=5,"annotations"=2) to use different " , "windows for each data table.
id_column	(character) Column name of the variable ids in variable_meta. " , "id_column="rownames" will use the rownames as ids.
...	Additional slots and values passed to struct_class.

### Value

A mzrt\_match object with the following output slots:

updated	(annotation_source) The input annotation source with the newly generated column.
---------	--

### Inheritance

A mzrt\_match object inherits the following struct classes:

```
[mzrt_match] -> [model] -> [struct_class]
```

**Examples**

```
M <- mzrt_match(
  variable_meta = data.frame(),
  mz_column = character(0),
  ppm_window = 5,
  id_column = character(0),
  rt_column = character(0),
  rt_window = 20)
```

---

mz\_match

*mz matching*


---

**Description**

Annotations will be matched to the measured data variable meta data.frame by determining which annotations ppm window overlaps with the ppm window from the measured mz.

**Usage**

```
mz_match(variable_meta, mz_column, ppm_window, id_column, ...)
```

**Arguments**

variable_meta	(data.frame) A data.frame of variable IDs and their corresponding mz values.
mz_column	(character) Column name of the mz values in variable_meta.
ppm_window	(numeric, integer) Ppm window to use for matching. If a single value is provided then the same ppm is used for both variable meta and the annotations. A named vector can also be provided e.g. c("variable_meta"=5,"annotations"=2) to use "different windows for each data table.
id_column	(character) Column name of the variable ids in variable_meta. id_column="rownames" will use the rownames as ids.
...	Additional slots and values passed to struct_class.

**Value**

A mz\_match object with the following output slots:

updated (annotation\_source) The input annotation source with the newly generated column.

**Inheritance**

A mz\_match object inherits the following struct classes:

```
[mz_match] -> [model] -> [struct_class]
```

**Examples**

```
M <- mz_match(
  variable_meta = data.frame(),
  mz_column = character(0),
  ppm_window = 5,
  id_column = character(0))
```

---

normalise_lipids	<i>Normalise Lipids nomenclature</i>
------------------	--------------------------------------

---

**Description**

Normalises differently formatted lipid names to a consistent format.

**Usage**

```
normalise_lipids(
  column_name,
  grammar = ".all",
  columns = ".all",
  suffix = "_goslin",
  batch_size = 10000,
  ...
)
```

**Arguments**

column_name	(character) The name of the column containing Lipids names to normalise.
grammar	(character) The grammar to use for normalising lipid names. Allowed values are: Shorthand2020, Goslin, FattyAcids, LipidMaps, SwissLipids, HMDB or .all. The default is ".all".
columns	(character) Column names to include from the goslin output. Can be any of "Normalized.Name", "Original.Name", "Grammar", "Adduct", "Adduct.Charge", "Lipid.Maps.Category", "Lipid.Maps.Main.Class", "Species.Name", "Extended.Species.Name", "Molecular.Species.Name", "Sn.Position.Name", "Structure.Defined.Name", "Full.Structure.Name", "Functional.Class.Abr", "Functional.Class.Synonyms", "Level", "Total.C", "Total.OH", "Total.O", "Total.DB", "Mass", "Sum.Formula"."all" will return all columns. ". The default is ".all".
suffix	(character) A suffix added to the column names of the goslin output. The default is "_goslin".
batch_size	(numeric, integer) The maximum number of annotations to be parsed by rgoslin at a time. If the batch size is less than the total number of records then the records will be split into multiple batches to help prevent crashes. The default is 10000.
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- rgoslin

## Value

A normalise\_lipids object with the following output slots:

updated (annotation\_source) Annotation\_source after normalising lipid names.

## Inheritance

A normalise\_lipids object inherits the following struct classes:

[normalise\_lipids] -> [model] -> [struct\_class]

## References

Kopczynski D, Hoffmann N, Peng B, Ahrends R (2020). "Goslin: A Grammar of Succinct Lipid Nomenclature." *Analytical Chemistry*, 92(16), 10957-10960. <https://pubs.acs.org/doi/10.1021/acs.analchem.0c01690>.

## Examples

```
M <- normalise_lipids(  
  column_name = "V1",  
  grammar = ".all",  
  columns = ".all",  
  suffix = "_goslin",  
  batch_size = 10000)
```

---

normalise\_strings      *Normalise string*

---

## Description

Replace matching (sub)strings based on a provided dictionary of search terms and their replacements.

## Usage

```
normalise_strings(  
  search_column,  
  output_column = NULL,  
  dictionary = list(),  
  ...  
)
```

## Arguments

search_column	(character) The column name of the input annotation_source that will be searched for matching (sub)strings.
output_column	(character, NULL) The name of a new column that the modified strings will be stored in. If NULL the search_column will be replaced. The default is NULL.
dictionary	(list, annotation_database) A list of patterns and functions that take the input pattern and return a replacement string. A annotation_database object containing a suitable list can also be used here. The default is list().
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- dplyr

Each item of the dictionary list should # have at least two fields: "pattern" and "replace". "pattern" is used as inputs to the [grep1()] function to detect matches to the input pattern. Parameters such as perl = TRUE can also be included in the list and these will be passed to [grep1()], otherwise the defaults are used. When a match is detected the function in "replace" is called with the same inputs as [grep1()]. The "replace" function should return a new string. Alternatively replace = NA can be used to return NA for a matching pattern. If a character string is provided then [gsub()] will be used by default.

## Value

A normalise\_strings object with the following output slots:

updated (annotation\_source) The updated annotations as an annotation\_source object.

## Inheritance

A normalise\_strings object inherits the following struct classes:

```
[normalise_strings] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

## See Also

[grep1\(\)](#), [gsub\(\)](#)

## Examples

```
M <- normalise_strings(  
  search_column = character(0),  
  output_column = NULL,  
  dictionary = list())
```

---

openbabel\_structure    *OpenBabel molecular structure*

---

## Description

Display an image of the molecular structure computed using OpenBabel.

## Usage

```
openbabel_structure(  
  smiles_column = "smiles",  
  row_index = 1,  
  image_size = 300,  
  hydrogens = "implicit",  
  carbons = "terminal",  
  double_bonds = "asymmetric",  
  colour_atoms = TRUE,  
  scale_to_fit = TRUE,  
  view_port = 300,  
  title_column = NULL,  
  subtitle_column = NULL,  
  ...  
)
```

## Arguments

- |               |   |
|---------------|---|
| smiles_column | (character) The name of the annotation_source column with compound identifiers of the type specified in the search_by param. The default is "smiles".   |
| row_index     | (integer, numeric) The row index of the annotation_source to request an image of the molecular structure of. The default is 1.  |
| image_size    | (numeric, integer) The size of the image to return in pixels. Images will be square. The default is 300.  |
| hydrogens     | (character) Hydrogen atoms. Allowed values are limited to the following: <ul style="list-style-type: none"><li>"implicit": Hydrogen atoms are not displayed.</li><li>"explicit": All hydrogen atoms are displayed.</li></ul> The default is "implicit".   |
| carbons       | (character) Carbon atoms. Allowed values are limited to the following: <ul style="list-style-type: none"><li>"none": Carbon atoms are not labelled.</li><li>"terminal": Terminal carbons and hydrogens are labelled.</li><li>"all": All carbon atoms will be labelled.</li></ul> The default is "terminal". |
| double_bonds  | (character) The display style of double carbon bonds. The default is "asymmetric".  |
| colour_atoms  | (logical) Display some atoms in colour. The default is TRUE.  |
| scale_to_fit  | (logical) Normalise coordinates. Allowed values are limited to the following:   |

- "TRUE": Molecules will be scaled to fit inside the bounding box of the image.
- "FALSE": Molecules will not be scaled to fit inside the bounding box of the image.

The default is TRUE.

view_port	(numeric, integer) Scales the image inside the viewport. Can be used to ensure a set of images have the same bond lengths and font sizes. Has no effect if <code>scale_to_fit = TRUE</code> . The molecule might be clipped if the viewport is too small. The default is 300.
title_column	(NULL, character) The column containing text to use as the title for the image. If NULL then no title is included. The default is NULL.
subtitle_column	(NULL, character) The column containing text to use as the subtitle for the image. If NULL then no subtitle is included. The default is NULL.
...	Additional slots and values passed to <code>struct_class</code> .

## Details

This object makes use of functionality from the following packages:

- ChemmineOB
- cowplot
- rsvg

## Value

A `openbabel_structure` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `openbabel_structure` object inherits the following struct classes:

```
[openbabel_structure] -> [chart] -> [struct_class]
```

## References

Horan K, Girke T (2023). *ChemmineOB: R interface to a subset of OpenBabel functionalities*. doi:10.18129/B9.bioc.ChemmineOB <https://doi.org/10.18129/B9.bioc.ChemmineOB>, R package version 1.40.0, <https://bioconductor.org/packages/ChemmineOB>.

Wilke C (2024). *cowplot: Streamlined Plot Theme and Plot Annotations for 'ggplot2'*. R package version 1.1.3, <https://CRAN.R-project.org/package=cowplot>.

Ooms J (2023). *rsvg: Render SVG Images into PDF, PNG, (Encapsulated) PostScript, or Bitmap Arrays*. R package version 2.6.0, <https://CRAN.R-project.org/package=rsvg>.

## Examples

```
M <- openbabel_structure(
  smiles_column = "V1",
  image_size = 300,
  hydrogens = "implicit",
  carbons = "terminal",
  double_bonds = "symmetric",
  colour_atoms = FALSE,
  scale_to_fit = FALSE,
  row_index = 1,
  view_port = 300,
  title_column = NULL,
  subtitle_column = NULL)
```

---

opsin\_lookup

*Compound ID lookup via OPSIN*

---

## Description

Uses the **OPSIN API** to search for identifiers based on the input annotation column.

## Usage

```
opsin_lookup(query_column, suffix = "_opsin", output = "cids", ...)
```

## Arguments

query_column	(character) The column name to use as the reference for searching the database e.g. "compound_name". OPSIN expect molecule names as input.
suffix	(character) A suffix appended to all column names in the returned result. The default is "_opsin".
output	(character) The value returned from the pubchem database. The default is "cids".
...	Additional slots and values passed to struct_class.

## Value

A opsin\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

## Inheritance

A opsin\_lookup object inherits the following struct classes:

```
[opsin_lookup] -> [rest_api] -> [model] -> [struct_class]
```

## References

Lowe, M. D, Corbett, T. P, Murray-Rust, Peter, Glen, C. R (2011). "Chemical Name to Structure: OPSIN, an Open ", "Source Solution." *Journal of Chemical Information and Modeling*, 51(3), 793-753. doi:10.1021/ci100384d <https://doi.org/10.1021/ci100384d>.



**Examples**

```
M <- opsin_lookup(
  output = "stdinchikey",
  base_url = "https://opsin.ch.cam.ac.uk/opsin",
  url_template = "<base_url>/<query_column>.<output>",
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

PathBank\_metabolite\_database

*PathBank\_metabolite\_database*


---

**Description**

Imports the PathBank database (<https://pathbank.org/>) of metabolites linked to pathways.

**Usage**

```
PathBank_metabolite_database(
  version = "primary",
  bfc_path = NULL,
  resource_name = "MetMashR_PathBank",
  ...
)
```

**Arguments**

version	(character) PathBank version. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"": The version of the PatchBank database to import. To prevent unnecessary downloads BiocFileCache is used to store a local copy.</li> <li>"complete": The complete PathBank metabolite database.</li> <li>"primary": The PathBank metabolite database for primary pathways only.</li> </ul> The default is "primary".
bfc_path	(character, NULL) BiocFileCache is used to cache the database locally and prevent unnecessary downloads. If a path is provided then BiocFileCache will use this location. If NULL it will use the default location (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is NULL.
resource_name	(character) The name given to this resource in the cache. (see <a href="#">BiocFileCache::BiocFileCache()</a> for details). The default is "MetMashR_PathBank".
...	Additional slots and values passed to struct_class.

**Details**

This object makes use of functionality from the following packages:

- BiocFileCache
- httr

**Value**

A PathBank\_metabolite\_database object. This object has no output slots.

**Inheritance**

A PathBank\_metabolite\_database object inherits the following struct classes:

```
[PathBank_metabolite_database] -> [BiocFileCache_database] -> [annotation_database]
-> [annotation_source] -> [struct_class]
```

**References**

Shepherd L, Morgan M (2024). *BiocFileCache: Manage Files Across Sessions*. R package version 2.10.2.

Wickham H (2023). *httr: Tools for Working with URLs and HTTP*. R package version 1.4.7, <https://CRAN.R-project.org/package=httr>.

Wishart, S D, Li, Carin, Marcu, Ana, Badran, Hasan, Pon, Allison, Budinski, Zachary, Patron, Jonas, Lipton, Debra, Cao, Xuan, Oler, Eponine, Li, Krissa, Paccoud, Maïlys, Hong, Chelsea, Guo, C A, Chan, Christopher, Wei, William, Ramirez-Gaona, Miguel (2019). "PathBank: a comprehensive pathway database for model organisms." *Nucleic Acids Research*, 48, D470-D478. doi:10.1093/nar/gkz861 <https://doi.org/10.1093/nar/gkz861>.

**Examples**

```
M <- PathBank_metabolite_database(
  version = "primary",
  bfc_path = NULL,
  resource_name = "bfc",
  bfc_fun = function(){},
  import_fun = function(){},
  offline = FALSE,
  tag = character(0),
  data = data.frame(),
  source = "ANY")
```

---

pivot\_columns

*Pivot longer*

---

**Description**

Combine multiple groups of columns into a single group of columns with group labels.

**Usage**

```
pivot_columns(column_groups, group_labels, ...)
```

**Arguments**

**column\_groups** (list) A named list of columns to group together into a single group of columns. There should be the same number of columns in each group.

**group\_labels** (list) A named list of columns and the label to use for all records in that column.

**...** Additional slots and values passed to struct\_class.

## Details

This object makes use of functionality from the following packages:

- dplyr

## Value

A `pivot_columns` object with the following output slots:

`updated` (`annotation_source`) The updated annotations as an `annotation_source` object.

## Inheritance

A `pivot_columns` object inherits the following struct classes:

```
[pivot_columns] -> [model] -> [struct_class]
```

## References

Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, <https://CRAN.R-project.org/package=dplyr>.

## Examples

```
M <- pivot_columns(  
  group_labels = list(),  
  column_groups = list())
```

---

`prioritise_columns`      *Combine several columns into a single column.*

---

## Description

Several columns are merged into a single column. If multiple columns contain overlapping values then priority can be given columns earlier in the list.

## Usage

```
prioritise_columns(  
  column_names,  
  output_name,  
  source_name,  
  source_tags = column_names,  
  clean = TRUE,  
  ...  
)
```

### Arguments

column_names	(character) The name(s) of column(s) to be combined.
output_name	(character) The name of the new column.
source_name	(character) The column name used to indicate the where the merged values originated.
source_tags	(character) The tags used to identify the source of each item in the new column. A tag should be provided for each column_name. By default the column name is used.
clean	(logical) Clean old columns. Allowed values are limited to the following: <ul style="list-style-type: none"><li>• "TRUE": The named columns are removed after being combined.</li><li>• "FALSE": The named columns are retained after being combined.</li></ul> The default is TRUE.
...	Additional slots and values passed to struct_class.

### Value

A prioritise\_columns object with the following output slots:

updated (annotation\_source) The input annotation source with the newly generated column.

### Inheritance

A prioritise\_columns object inherits the following struct classes:

```
[prioritise_columns] -> [model] -> [struct_class]
```

### Examples

```
M <- prioritise_columns(  
  column_names = "V1",  
  output_name = "",  
  clean = FALSE,  
  source_name = "source_name",  
  source_tags = "x")
```

---

pubchem\_compound\_lookup

*Compound ID lookup via PubChem*

---

### Description

Uses the PubChem API to search for CID based on the input annotation column.

**Usage**

```
pubchem_compound_lookup(
  query_column,
  search_by,
  suffix = "_pubchem",
  output = "cids",
  records = "best",
  ...
)
```

**Arguments**

query_column	(character) The column name to use as the reference for searching the database e.g. "HMBD_ID".
search_by	(character) The PubChem domain to search for matches to the annotation_column.
suffix	(character) A suffix appended to all column names in the returned result. The default is "_pubchem".
output	(character) The value returned from the pubchem database. The default is "cids".
records	(character) Returned record(s). Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"": Sometimes there are multiple matches to the PubChem, database especially when searching by name.</li> <li>"best": Return only the best matching record.</li> <li>"all": Return all matching records.</li> </ul> The default is "best".
...	Additional slots and values passed to struct_class.

**Value**

A pubchem\_compound\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

**Inheritance**

A pubchem\_compound\_lookup object inherits the following struct classes:

```
[pubchem_compound_lookup] -> [rest_api] -> [model] -> [struct_class]
```

**Examples**

```
M <- pubchem_compound_lookup(
  search_by = "cid",
  output = "cids",
  records = "best",
  base_url = "https://pubchem.ncbi.nlm.nih.gov/rest/pug/compound",
  url_template = "<base_url>/<search_by>/<query_column>/<output>/JSON",
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

pubchem\_property\_lookup

*Compound property lookup via pubchem*


---

## Description

Uses the PubChem API to search for CID based on the input annotation column and returns property information.

## Usage

```
pubchem_property_lookup(
  query_column,
  search_by,
  suffix = "_pubchem",
  property = "InChIKey",
  ...
)
```

## Arguments

query_column	(character) The column name to use as the reference for searching the database e.g. "HMBD_ID".
search_by	(character) The PubChem domain to search for matches to the annotation_column.
suffix	(character) A suffix appended to all column names in the returned result. The default is "_pubchem".
property	(character) A comma separated list of properties to return from the pubchem database. (see <a href="https://pubchem.ncbi.nlm.nih.gov/docs/pug-rest#section=Compound-Property-Tables">https://pubchem.ncbi.nlm.nih.gov/docs/pug-rest#section=Compound-Property-Tables</a> for details). Keyword ".all" will return all properties. The default is "InChIKey".
...	Additional slots and values passed to struct_class.

## Value

A pubchem\_property\_lookup object with the following output slots:

updated (annotation\_source) The annotation\_source after adding data returned by the API.

## Inheritance

A pubchem\_property\_lookup object inherits the following struct classes:

```
[pubchem_property_lookup] -> [pubchem_compound_lookup] -> [rest_api] -> [model] ->
[struct_class]
```

**Examples**

```
M <- pubchem_property_lookup(
  search_by = "cid",
  property = "InChIKey",
  output = "cids",
  records = "best",
  base_url = "https://pubchem.ncbi.nlm.nih.gov/rest/pug/compound",
  url_template = "<base_url>/<search_by>/<query_column>/property/<property>/JSON",
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

pubchem_structure	<i>PubChem molecular structure</i>
-------------------	------------------------------------

---

**Description**

Query the PubChem api and retrieve a display an image of the matching molecular structure.

**Usage**

```
pubchem_structure(
  query_column,
  search_by,
  row_index,
  record_type = "2d",
  image_size = "large",
  ...
)
```

**Arguments**

query_column	(character) The name of the annotation_source column with compound identifiers of the type specified in the search_by param.
search_by	(character) The PubChem domain to search for matches to the annotation_column.
row_index	(integer, numeric) The row index of the annotation_source to request an image of the molecular structure of.
record_type	(character) The record type to return from the PubChem query. Can be one of "2d" or "3d". The default is "2d".
image_size	(character) The size of the image to return from the PubChem query. Can be one of "large" or "small". For record_type = "2d" an arbitrary image size can be specified e.g. 123x123. The default is "large".
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- cowplot

This object queries the PubChem API for matches to your query without caching the results. It is therefore intended for limited use. If you wish to obtain images for a large number of molecules you should seek an alternative solution.

## Value

A `pubchem_structure` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `pubchem_structure` object inherits the following struct classes:

```
[pubchem_structure] -> [chart] -> [struct_class]
```

## References

Wilke C (2024). *cowplot: Streamlined Plot Theme and Plot Annotations for 'ggplot2'*. R package version 1.1.3, <https://CRAN.R-project.org/package=cowplot>.

## Examples

```
M <- pubchem_structure(
  query_column = "V1",
  search_by = "cid",
  row_index = 1,
  record_type = "2d",
  image_size = "large")
```

---

pubchem\_widget

*PubChem widget*

---

## Description

Display a PubChem HTML widget for a compound.

## Usage

```
pubchem_widget(
  query_column,
  row_index,
  record_type = "2D-Structure",
  hide_title = FALSE,
  width = "600px",
  height = "650px",
  display = TRUE,
  ...
)
```



## Arguments

query_column	(character) The name of the annotation_source column with compound identifiers of the type specified in the search_by param.
row_index	(integer, numeric) The row index of the annotation_source to request an image of the molecular structure of.
record_type	(character) The record type for the widget. The default is "2D-Structure".
hide_title	(logical) Hide widget title. Allowed values are limited to the following: <ul style="list-style-type: none"><li>"TRUE": The title is displayed.</li><li>"FALSE": The title is not displayed.</li></ul> The default is FALSE.
width	(integer, numeric, character) The width of the widget in a CSS style compatible format. Numerical values will be converted to character. The default is "600px".
height	(integer, numeric, character) The height of the widget in a CSS style compatible format. Numerical values will be converted to character. The default is "650px".
display	(logical) Display widget. Allowed values are limited to the following: <ul style="list-style-type: none"><li>"TRUE": Display the widget.</li><li>"FALSE": Do not display the widget and only return the HTML.</li></ul> The default is TRUE.
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- htmltools

## Value

A `pubchem_widget` object. This object has no output slots. See `chart_plot` in the `struct` package to plot this chart object.

## Inheritance

A `pubchem_widget` object inherits the following `struct` classes:

```
[pubchem_widget] -> [chart] -> [struct_class]
```

## References

Cheng J, Sievert C, Schloerke B, Chang W, Xie Y, Allen J (2024). *htmltools: Tools for HTML*. R package version 0.5.8.1, <https://CRAN.R-project.org/package=htmltools>.

## Examples

```
M <- pubchem_widget(  
  query_column = "V1",  
  row_index = 1,  
  record_type = "2D-Structure",  
  hide_title = FALSE,  
  width = 600,  
  height = 400,  
  display = FALSE)
```

---

racemic_dictionary	<i>Racemic dictionary</i>
--------------------	---------------------------

---

## Description

This dictionary removes racemic properties from molecule names. It is intended for use with the [normalise\\_strings\(\)](#) object.

## Usage

```
racemic_dictionary
```

## Format

An object of class `list` of length 5.

## Value

A dictionary for use with [normalise\\_strings\(\)](#)

## Examples

```
M <- normalise_strings(  
  search_column = "example",  
  output_column = "result",  
  dictionary = racemic_dictionary  
)
```

---

rdata_database	<i>rdata database</i>
----------------	-----------------------

---

## Description

A `data.frame` stored as an RData file.

## Usage

```
rdata_database(source = character(0), variable_name, ...)
```

**Arguments**

source (ANY) The source of annotation data. The default is `character(0)`.

variable\_name (character, function) The name of the `data.frame` in the imported workspace to use as the `data.frame` for this source. A function can be provided to e.g. extract a `data.frame` from a list in the imported environment.

... Additional slots and values passed to `struct_class`.

**Value**

A `rdata_database` object. This object has no output slots.

**Inheritance**

A `rdata_database` object inherits the following `struct` classes:

```
[rdata_database] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

**See Also**

Other annotation databases: [AnnotationDb\\_database](#), [GO\\_database](#), [annotation\\_database](#), [annotation\\_source](#), [excel\\_database](#), [rds\\_cache](#), [rds\\_database](#)

**Examples**

```
M <- rdata_database(
  variable_name = "a data frame",
  tag = character(0),
  data = data.frame(),
  source = "ANY")
```

---

rds\_cache

*rds cache*


---

**Description**

A `data.frame` stored as an RDS file. Intended to be used with `rest_api` objects as mechanism for caching search results. The `data.frame` for an `rds_cache` object must have a column named `".search"`.

**Usage**

```
rds_cache(
  source = character(0),
  data = data.frame(.search = character(0)),
  ...
)
```

**Arguments**

source (ANY) The source of annotation data. The default is `character(0)`.

data (data.frame, NULL) A data.frame of annotation data. The default is `data.frame(.search = character(0))`.

... Additional slots and values passed to `struct_class`.

**Value**

A `rds_cache` object. This object has no output slots.

**Inheritance**

A `rds_cache` object inherits the following struct classes:

```
[rds_cache] -> [rds_database] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

**See Also**

Other annotation databases: [AnnotationDb\\_database](#), [GO\\_database](#), [annotation\\_database](#), [annotation\\_source](#), [excel\\_database](#), [rdata\\_database](#), [rds\\_database](#)

**Examples**

```
M <- rds_cache(
  tag = character(0),
  data = data.frame(),
  source = "ANY")
```

---

rds_database	<i>rds database</i>
--------------	---------------------

---

**Description**

A data.frame stored as an RDS file.

**Usage**

```
rds_database(source = character(0), ...)
```

**Arguments**

source (ANY) The source of annotation data. The default is `character(0)`.

... Additional slots and values passed to `struct_class`.

**Value**

A `rds_database` object. This object has no output slots.

## Inheritance

A rds\_database object inherits the following struct classes:

```
[rdatabase] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

## See Also

Other annotation databases: [AnnotationDb\\_database](#), [GO\\_database](#), [annotation\\_database](#), [annotation\\_source](#), [excel\\_database](#), [rdata\\_database](#), [rds\\_cache](#)

## Examples

```
M <- rds_database(  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```

---

read_database	<i>Read a database</i>
---------------	------------------------

---

## Description

Reads an annotation\_database and returns the data.frame.

## Usage

```
read_database(obj, ...)  
  
## S4 method for signature 'annotation_database'  
read_database(obj)  
  
## S4 method for signature 'AnnotationDb_database'  
read_database(obj)  
  
## S4 method for signature 'BiocFileCache_database'  
read_database(obj)  
  
## S4 method for signature 'MTox700plus_database'  
read_database(obj)  
  
## S4 method for signature 'PathBank_metabolite_database'  
read_database(obj)  
  
## S4 method for signature 'excel_database'  
read_database(obj)  
  
## S4 method for signature 'github_file'  
read_database(obj)  
  
## S4 method for signature 'mwb_refmet_database'
```

```

read_database(obj)

## S4 method for signature 'rdata_database'
read_database(obj)

## S4 method for signature 'rds_database'
read_database(obj)

## S4 method for signature 'sqlite_database'
read_database(obj)

```

### Arguments

```

obj          An annotation_database object
...         additional database specific inputs

```

### Value

A data.frame

### Examples

```

M <- rds_database(tempfile())
df <- read_database(M)

```

---

read_source	<i>Import annotation source</i>
-------------	---------------------------------

---

### Description

Import an data from e.g. a raw file and parse it into an [annotation\\_source\(\)](#) object.

### Usage

```

read_source(obj, ...)

## S4 method for signature 'annotation_source'
read_source(obj)

## S4 method for signature 'annotation_database'
read_source(obj)

## S4 method for signature 'cd_source'
read_source(obj)

## S4 method for signature 'ls_source'
read_source(obj)

```

### Arguments

```

obj          an annotation\_source\(\) object
...         not currently used

```

**Value**

an `annotation_table()` or `annotation_database()` object

**Examples**

```
# prepare source
CD <- cd_source(
  source = system.file(
    paste0("extdata/MTox/CD/HILIC_POS.xlsx"),
    package = "MetMashR"
  )
)
```

---

remove_columns	<i>Select columns</i>
----------------	-----------------------

---

**Description**

A wrapper around `tidyselect::eval_select`. Remove columns from an annotation table using tidy grammar.

**Usage**

```
remove_columns(expression = everything(), ...)
```

**Arguments**

`expression` (call) A valid `rlang::expr` for tidy evaluation via `eval_select`. e.g. `expression = all_of(c("foo", "bar"))` will select columns named "foo" and "bar" from the annotation data.frame. . The default is `everything()`.

`...` Additional slots and values passed to `struct_class`.

**Details**

This object makes use of functionality from the following packages:

- `tidyselect`
- `rlang`

**Value**

A `remove_columns` object with the following output slots:

`updated` (`annotation_source`) The updated annotations as an `annotation_source` object.

**Inheritance**

A `remove_columns` object inherits the following struct classes:

```
[remove_columns] -> [model] -> [struct_class]
```

## References

Henry L, Wickham H (2024). *tidyselect: Select from a Set of Strings*. R package version 1.2.1, <https://CRAN.R-project.org/package=tidyselect>.

Henry L, Wickham H (2024). *rlang: Functions for Base Types and Core R and 'Tidyverse' Features*. R package version 1.1.3, <https://CRAN.R-project.org/package=rlang>.

## See Also

`dplyr::select()`

`tidyselect::eval_select()`

## Examples

```
M <- remove_columns(  
  expression = call("example"))
```

---

rename_columns	<i>Select columns</i>
----------------	-----------------------

---

## Description

A wrapper around `dplyr::rename`. Rename columns from an annotation table using tidy grammar.

## Usage

```
rename_columns(expression, ...)
```

## Arguments

`expression` (call) A valid `rlang::expr` for tidy evaluation e.g. `expression = all_of(c("foo"="bar"))` will rename the column named "bar" and "foo". .

`...` Additional slots and values passed to `struct_class`.

## Details

This object makes use of functionality from the following packages:

- tidyselect
- rlang

## Value

A `rename_columns` object with the following output slots:

`updated` (`annotation_source`) The updated annotations as an `annotation_source` object.



## Inheritance

A `rename_columns` object inherits the following struct classes:

```
[rename_columns] -> [model] -> [struct_class]
```

## References

Henry L, Wickham H (2024). *tidyselect: Select from a Set of Strings*. R package version 1.2.1, <https://CRAN.R-project.org/package=tidyselect>.

Henry L, Wickham H (2024). *rlang: Functions for Base Types and Core R and 'Tidyverse' Features*. R package version 1.1.3, <https://CRAN.R-project.org/package=rlang>.

## Examples

```
M <- rename_columns(  
  expression = call("example"))
```

---

required\_cols

*Required columns in an annotation source*

---

## Description

Some `annotation_sources`, such as LCMS tables (`lcms_table`), require that certain columns are present in the `data.frame`. These are defined by slots in the source definition. The name of slots containing the required column names for a source can be retrieved using the `required_cols` function, which will collect and return the names of slots containing required column names for the object and all of its parent objects.

## Usage

```
required_cols(obj, ...)  
  
## S4 method for signature 'annotation_source'  
required_cols(obj)
```

## Arguments

`obj` an `annotation_source` object  
`...` additional source specific inputs

## Value

a character vector of slot names

**Examples**

```
# prepare object
M <- lcms_table(id_column = "id", mz_column = "mz", rt_column = "rt")

#' # get values for required slots
r <- required_cols(M)

# get slot names for required columns
names(r)
```

---

*rest\_api**rest\_api*

---

**Description**

A base class providing common methods for making REST API calls.

**Usage**

```
rest_api(
  base_url,
  url_template,
  suffix,
  status_codes,
  delay,
  cache = NULL,
  query_column,
  ...
)
```

**Arguments**

<code>base_url</code>	(character) The base URL of the API.
<code>url_template</code>	(character) A template describing how the URL should be constructed from the base URL and input parameters. e.g. <code>&lt;base_url&gt;//&lt;input_item&gt;/&lt;search_term&gt;/json</code> . The url will be constructed by replacing the values enclosed in <code>&lt;&gt;</code> with the value from corresponding input parameter of the <code>rest_api</code> object.
<code>suffix</code>	(character) A suffix appended to all column names in the returned result.
<code>status_codes</code>	(list) Named list of status codes and function indicating how to respond. Should minimally contain a function to parse a successful response for status code 200. Any codes not provided will be passed to <code>httr::stop_for_status()</code> .
<code>delay</code>	(numeric, integer) Delay in seconds between API calls.
<code>cache</code>	( <code>annotation_database</code> , <code>NULL</code> ) A struct cache object that contains parsed responses to previous api queries. If not using a cache then set to <code>NULL</code> . The default is <code>NULL</code> .
<code>query_column</code>	(character) The name of a column in the annotation table containing values to search in the api call.
<code>...</code>	Additional slots and values passed to <code>struct_class</code> .

**Value**

A `rest_api` object with the following output slots:

`updated` (`annotation_source`) The `annotation_source` after adding data returned by the API.

**Inheritance**

A `rest_api` object inherits the following struct classes:

```
[rest_api] -> [model] -> [struct_class]
```

**See Also**

Other REST API's: [classyfire\\_lookup](#), [kegg\\_lookup](#), [lipidmaps\\_lookup](#), [mwb\\_compound\\_lookup](#)

**Examples**

```
M <- rest_api(
  base_url = "V1",
  url_template = character(0),
  query_column = character(0),
  cache = NULL,
  status_codes = list(),
  delay = 0.5,
  suffix = "_rest_api")
```

---

rt\_match

*rt matching*

---

**Description**

Annotations will be matched to the measured variable meta data.frame by determining which annotations `rt` window overlaps with the `rt` window from the measured `rt`.

**Usage**

```
rt_match(variable_meta, rt_column, rt_window, id_column, ...)
```

**Arguments**

`variable_meta` (data.frame) A data.frame of variable IDs and their corresponding `rt` values.

`rt_column` (character) Column name of the `rt` values in `variable_meta`.

`rt_window` (numeric, integer) `Rt` window to use for matching. If a single value is provided then the same `rt` is used for both variable meta and the annotations. A named vector can also be provided e.g. `c("variable_meta"=5,"annotations"=2)` to use different "windows" for each data table.

`id_column` (character) Column name of the variable ids in `variable_meta`. ", "id\_column"="rownames" will use the rownames as ids.

... Additional slots and values passed to `struct_class`.

**Value**

A `rt_match` object with the following output slots:

`updated` (`annotation_table`) The input annotation source with the newly generated column.

**Inheritance**

A `rt_match` object inherits the following struct classes:

```
[rt_match] -> [model] -> [struct_class]
```

**Examples**

```
M <- rt_match(
  variable_meta = data.frame(),
  rt_column = character(0),
  rt_window = 20,
  id_column = character(0))
```

---

select_columns	<i>Select columns</i>
----------------	-----------------------

---

**Description**

A wrapper around `tidyselect::eval_select`. Select columns from an annotation table using tidy grammar. This imitates `dplyr::select()`.

**Usage**

```
select_columns(expression = everything(), ...)
```

**Arguments**

`expression` (call) A valid `rlang::expr` for tidy evaluation via `eval_select`. e.g. `expression = all_of(c("foo", "bar"))` will select columns named "foo" and "bar" from the annotation `data.frame`. . The default is `everything()`.

`...` Additional slots and values passed to `struct_class`.

**Details**

This object makes use of functionality from the following packages:

- tidyselect
- rlang

**Value**

A `select_columns` object with the following output slots:

updated (annotation\_source) The updated annotations as an annotation\_source object.

### Inheritance

A select\_columns object inherits the following struct classes:

```
[select_columns] -> [model] -> [struct_class]
```

### References

Henry L, Wickham H (2024). *tidyselect: Select from a Set of Strings*. R package version 1.2.1, <https://CRAN.R-project.org/package=tidyselect>.

Henry L, Wickham H (2024). *rlang: Functions for Base Types and Core R and 'Tidyverse' Features*. R package version 1.1.3, <https://CRAN.R-project.org/package=rlang>.

### See Also

[dplyr::select\(\)](#)

[tidyselect::eval\\_select\(\)](#)

### Examples

```
M <- select_columns(  
  expression = call("example"))
```

---

split\_column

*Split a column*

---

### Description

A wrapper for [strsplit](#). Divides a column into multiple columns by dividing the contents

### Usage

```
split_column(  
  column_name,  
  separator = "_",  
  padding = NA,  
  keep_indices = NULL,  
  clean = TRUE,  
  ...  
)
```

**Arguments**

column_name	(character) The column name in the annotation_source split.
separator	(character) A substring to split the column by. The default is "_".
padding	(character, logical) A character string used to represent missing and zero length strings after splitting. The default is NA.
keep_indices	(numeric, integer) The indices of columns to keep after splitting. If NULL then all columns are retained. The default is NULL.
clean	(logical) Clean old columns. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>"TRUE": The named columns are removed after being split.</li> <li>"FALSE": The named columns are retained after being split.</li> </ul> The default is TRUE.
...	Additional slots and values passed to struct_class.

**Value**

A split\_column object with the following output slots:

updated (annotation\_source) The annotation\_source after splitting the column.

**Inheritance**

A split\_column object inherits the following struct classes:

[split\_column] -> [model] -> [struct\_class]

**Examples**

```
M <- split_column(
  column_name = "V1",
  separator = "_",
  clean = FALSE,
  padding = FALSE,
  keep_indices = numeric(0))
```

---

split\_records

*Expand records*


---

**Description**

Expand single records into multiple records by splitting strings in a named column at the chosen separator. For example, if a for a record the column synonyms = c("glucose, dextrose") then by splitting at the comma results in two records, one for glucose and one for dextrose with identical values (apart from the column being split). The original record is removed.

## Usage

```
split_records(column_name, separator, clean = TRUE, ...)
```

## Arguments

column_name	(character) The column name of the annotation_source to split into multiple records.
separator	(character) The substring used to split the values in column_name into multiple records.
clean	(logical) Remove the original column. If FALSE the original column will be retained in the final output with .original appended to the column name. The default is TRUE.
...	Additional slots and values passed to struct_class.

## Details

This object makes use of functionality from the following packages:

- tidytext

## Value

A split\_records object with the following output slots:

updated (annotation\_source) The updated annotations as an annotation\_source object.

## Inheritance

A split\_records object inherits the following struct classes:

```
[split_records] -> [model] -> [struct_class]
```

## References

Silge J, Robinson D (2016). "tidytext: Text Mining and Analysis Using Tidy Data Principles in R." *JOSS*, 1(3). doi:10.21105/joss.00037 <https://doi.org/10.21105/joss.00037>, <http://dx.doi.org/10.21105/joss.00037>.

## Examples

```
M <- split_records(  
  column_name = character(0),  
  separator = ",",  
  clean = FALSE)
```

---

sqlite_database	<i>SQLite database</i>
-----------------	------------------------

---

### Description

A data.frame stored in an SQLite database.

### Usage

```
sqlite_database(source, table = "annotation_database", ...)
```

### Arguments

source	(ANY) The source of annotation data.
table	(character) The name of a table in the SQLite database. The default is "annotation_database".
...	Additional slots and values passed to struct_class.

### Details

This object makes use of functionality from the following packages:

- RSQLite

### Value

A `sqlite_database` object. This object has no output slots.

### Inheritance

A `sqlite_database` object inherits the following struct classes:

```
[sqlite_database] -> [annotation_database] -> [annotation_source] -> [struct_class]
```

### References

Müller K, Wickham H, James DA, Falcon S (2024). *RSQLite: SQLite Interface for R*. R package version 2.3.7, <https://CRAN.R-project.org/package=RSQLite>.

### See Also

Other database: [BiocFileCache\\_database](#)

### Examples

```
M <- sqlite_database(  
  table = character(0),  
  tag = character(0),  
  data = data.frame(),  
  source = "ANY")
```



---

trim_whitespace	<i>Trim whitespace</i>
-----------------	------------------------

---

### Description

A wrapper for `trimws()`. Removes leading and/or trailing whitespace from character strings.

### Usage

```
trim_whitespace(column_names, which = "both", whitespace = "[ \\t\\r\\n]", ...)
```

### Arguments

column_names	(character) The column name(s) in the annotation_source to trim white space from. Special case ".all" will apply to all columns.
which	(character) Trailing and/or leading whitespace. Allowed values are limited to the following: <ul style="list-style-type: none"> <li>• "": A character string specifying the location of whitespace to remove.</li> <li>• "left": Remove leading whitespace.</li> <li>• "right": Remove trailing whitespace.</li> <li>• "both": Remove both leading and trailing whitespace.</li> </ul> The default is "both".
whitespace	(character) A string specifying a regular expression to match (one character of) "white space". See <code>trimws()</code> for details. The default is "[ ]".
...	Additional slots and values passed to struct_class.

### Value

A trim\_whitespace object with the following output slots:

updated	(annotation_source) The annotation_source after trimming whitespace.
---------	--

### Inheritance

A trim\_whitespace object inherits the following struct classes:

```
[trim_whitespace] -> [model] -> [struct_class]
```

### Examples

```
M <- trim_whitespace(
  column_names = "V1",
  which = "both",
  whitespace = "[
]")
```

---

tripeptide\_dictionary *Tripeptide dictionary*

---

**Description**

A dictionary for converting tripeptides encoded using single letter IUPAC codes to use three letter codes for amino acids separated by hyphens. e.g. INK becomes Ile-Asn-Lys

**Usage**

```
tripeptide_dictionary
```

**Format**

An object of class list of length 1.

**Value**

A dictionary for use with `normalise_strings()`

**Examples**

```
M <- normalise_strings(  
  search_column = "example",  
  output_column = "result",  
  dictionary = tripeptide_dictionary  
)
```

---

unique\_records *Keep unique\_records*

---

**Description**

reduces an annotation source to unique records only; all duplicates are removed.

**Usage**

```
unique_records(...)
```

**Arguments**

... Additional slots and values passed to `struct_class`.

**Value**

A `unique_records` object with the following output slots:

updated (annotation\_source) The updated annotations as an `annotation_source` object.

**Inheritance**

A unique\_records object inherits the following struct classes:

```
[unique_records] -> [model] -> [struct_class]
```

**Examples**

```
M <- unique_records()
```

---

unzip_before_cache	<i>Unzip file before caching with BiocFileCache_database</i>
--------------------	--

---

**Description**

This helper function is for use with `BiocFileCache_database()` objects. Using it as the `bfc_fun` input for this object will unzip a downloaded resource into a temporary folder before storing it in the cache.

**Usage**

```
unzip_before_cache(from, to)
```

**Arguments**

from	incoming path
to	the outgoing path

**Value**

TRUE if successful

**Examples**

```
M <- BiocFileCache_database(  
  source = tempfile(),  
  resource_name = "example",  
  bfc_fun = unzip_before_cache  
)
```

---

vertical_join	<i>Join sources vertically</i>
---------------	--------------------------------

---

### Description

A function to join sources vertically. A vertical join involves matching common columns across source data.frames and padding missing columns to create a single new data.frame with data and records from multiple sources.

### Usage

```
vertical_join(x, y, ...)

## S4 method for signature 'annotation_source,annotation_source'
vertical_join(
  x,
  y,
  matching_columns = NULL,
  keep_cols = NULL,
  source_col = "annotation_source",
  exclude_cols = NULL,
  as = annotation_source()
)

## S4 method for signature 'list,missing'
vertical_join(
  x,
  y,
  matching_columns = NULL,
  keep_cols = NULL,
  source_col = "annotation_source",
  exclude_cols = NULL,
  as = annotation_source()
)
```

### Arguments

x	an annotation_source object
y	an second annotation_source object to join with the first
...	additional inputs (not currently used)
matching_columns	(list) a named list of column names that all contain the same information. All columns named in the same list element will be merged into a single column with the same name as the list element.
keep_cols	(character) a list of column names to keep in the final joined table. All other columns will be dropped.
source_col	(character) the name of a new column that will contain the tags of the original source object for each row in the joined table.
exclude_cols	(character) the names of columns to exclude from the joined table.
as	(character) the type of object the joined table should be returned as e.g. "lcms_table".

**Value**

an `annotation_source` object

**Examples**

```
M <- annotation_source(data = data.frame(id = 1, value = "A"))
N <- annotation_source(data = data.frame(id = 2, value = "B"))
O <- vertical_join(M, N, keep_cols = ".all")
```

---

wherever

*Filter helper function to select records*

---

**Description**

Returns a list of quosures for use with `filter_records` to allow the use of dplyr-style expressions. See examples.

**Usage**

```
wherever(...)
```

**Arguments**

... Expressions that return a logical value and are defined in terms of the columns in the `annotation_source`. If multiple conditions are included then they are combined with the `&` operator. Only records for which all conditions evaluate to TRUE are kept.

**Value**

a list of quosures for use with `filter_records`

**See Also**

[filter\\_records\(\)](#)

**Examples**

```
# some annotation data
AN <- annotation_source(data = iris)

# filter to setosa where Sepal length is less than 5
M <- filter_records(
  wherever(
    Species == "setosa",
    Sepal.Length < 5
  )
)
M <- model_apply(M, AN)
predicted(M) # 20 rows
```

---

write_database	<i>Write to a database</i>
----------------	----------------------------

---

**Description**

Writes a data.frame to a annotation\_database.

**Usage**

```
write_database(obj, ...)  
  
## S4 method for signature 'annotation_database'  
write_database(obj, df)  
  
## S4 method for signature 'rds_database'  
write_database(obj, df)  
  
## S4 method for signature 'sqlite_database'  
write_database(obj, df)
```

**Arguments**

obj	A annotation_database object
...	additional database specific inputs
df	(data.frame) the data.frame to store in the database.

**Value**

Silently returns TRUE if successful, FALSE otherwise

**Examples**

```
M <- rds_database(tempfile())  
write_database(M, data.frame())
```

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