

# Package ‘chevreulShiny’

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**Type** Package

**Title** Tools for managing SingleCellExperiment objects as projects

**Version** 1.1.0

**Description** Tools for managing SingleCellExperiment objects as projects.

Includes functions for analysis and visualization of single-cell data.

Also included is a shiny app for visualization of pre-processed scRNA data.

Supported by NIH grants R01CA137124 and R01EY026661 to David Cobrinik.

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**URL** <https://github.com/whtns/chevreulShiny>,

<https://whtns.github.io/chevreulShiny/>

**Date** 2024-03-24

**BugReports** <https://github.com/cobriniklab/chevreulShiny/issues>

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**Imports** alabaster.base, clustree, ComplexHeatmap, DataEditR (>= 0.0.9), DBI, dplyr, DT, EnhancedVolcano, fs, future, ggplot2, ggplotify, grDevices, methods, patchwork, plotly, purrr, rappdirs, readr, RSQLite, S4Vectors, scales, shinyFiles, shinyhelper, shinyjs, shinyWidgets, stats, stringr, tibble, tidy, tidyselect, utils, waiter, wigglyplotr

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chevreulShiny-package    *chevreulShiny: Tools for managing SingleCellExperiment objects as projects*

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## Description

Tools for managing SingleCellExperiment objects as projects. Includes functions for analysis and visualization of single-cell data. Also included is a shiny app for visualization of pre-processed scRNA data. Supported by NIH grants R01CA137124 and R01EY026661 to David Cobrinik.

## Author(s)

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## See Also

Useful links:

- <https://github.com/whtns/chevreulShiny>
- <https://whtns.github.io/chevreulShiny/>
- Report bugs at <https://github.com/cobriniklab/chevreulShiny/issues>

---

append\_to\_project\_db    *Update a database of chevreulShiny projects*

---

## Description

Append projects to database

## Usage

```
append_to_project_db(
  new_project_path,
  cache_location = "~/cache/chevreul",
  sqlite_db = "single-cell-projects.db",
  verbose = TRUE
)
```

## Arguments

|                  |                                  |
|------------------|----------------------------------|
| new_project_path | new project path                 |
| cache_location   | Path to cache "~/cache/chevreul" |
| sqlite_db        | sqlite db                        |
| verbose          | print messages                   |

**Value**

a sqlite database with SingleCellExperiment objects

---

|                  |                                           |
|------------------|-------------------------------------------|
| cc.genes.cyclone | <i>Cyclone cell cycle pairs by symbol</i> |
|------------------|-------------------------------------------|

---

**Description**

cell cycle genes with paired expression represented by HGNC symbol

**Usage**

```
cc.genes.cyclone
```

**Format**

a list of dataframes with G1, G2, and S gene expression

**G1** G1 gene symbols

**G2** G2 gene symbols

**S** S gene symbols ...

**Source**

cyclone

---

|             |                                                 |
|-------------|-------------------------------------------------|
| chevreulApp | <i>Create a shiny app for a project on disk</i> |
|-------------|-------------------------------------------------|

---

**Description**

Create a shiny app for a project on disk

**Usage**

```
chevreulApp(
  preset_project,
  appTitle = "chevreul",
  organism_type = "human",
  futureMb = 13000,
  db_name = "single-cell-projects.db"
)
```

**Arguments**

|                |                                                                 |
|----------------|-----------------------------------------------------------------|
| preset_project | A preloaded project to start the app with                       |
| appTitle       | A title of the App                                              |
| organism_type  | human or mouse                                                  |
| futureMb       | amount of Mb allocated to future package                        |
| db_name        | sqlite database with list of saved SingleCellExperiment objects |

**Value**

a shiny app

---

|                   |                                             |
|-------------------|---------------------------------------------|
| create_project_db | Create a database of chevreulShiny projects |
|-------------------|---------------------------------------------|

---

**Description**

Create a database containing chevreulShiny projects

**Usage**

```
create_project_db(  
  cache_location = "~/cache/chevreul",  
  sqlite_db = "single-cell-projects.db",  
  verbose = TRUE  
)
```

**Arguments**

|                |                                  |
|----------------|----------------------------------|
| cache_location | Path to cache "~/cache/chevreul" |
| sqlite_db      | Database to be created           |
| verbose        | print messages                   |

**Value**

a sqlite database with SingleCellExperiment objects

---

|                    |                                        |
|--------------------|----------------------------------------|
| create_proj_matrix | Create a Table of single Cell Projects |
|--------------------|----------------------------------------|

---

**Description**

Uses a list of projects to create a matrix of single cell projects

**Usage**

```
create_proj_matrix(proj_list)
```

**Arguments**

|           |                  |
|-----------|------------------|
| proj_list | List of projects |
|-----------|------------------|

**Value**

a tibble of single cell projects

---

|                 |                                       |
|-----------------|---------------------------------------|
| ensembl_version | <i>Ensembl version used for build</i> |
|-----------------|---------------------------------------|

---

### Description

Ensembl version used for build

### Usage

ensembl\_version

### Format

An object of class character of length 1.

### Source

<http://www.ensembl.org/>

### Examples

```
# ensembl_version
```

---

|                          |                                  |
|--------------------------|----------------------------------|
| get_transcripts_from_sce | <i>Get Transcripts in object</i> |
|--------------------------|----------------------------------|

---

### Description

Get transcript ids in objects for one or more gene of interest

### Usage

```
get_transcripts_from_sce(object, gene)
```

### Arguments

|        |                               |
|--------|-------------------------------|
| object | A SingleCellExperiment object |
| gene   | Gene of interest              |

### Value

transcripts constituting a gene of interest in a SingleCellExperiment object

---

|        |                              |
|--------|------------------------------|
| grch38 | <i>Human annotation data</i> |
|--------|------------------------------|

---

## Description

Human (*Homo sapiens*) annotations based on genome assembly GRCH38 from Ensembl.

## Usage

```
grch38
```

## Format

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 76062 rows and 9 columns.

## Details

Variables:

- `ensgene`
- `entrez`
- `symbol`
- `chr`
- `start`
- `end`
- `strand`
- `biotype`
- `description`

## Source

[http://ensembl.org/homo\\_sapiens](http://ensembl.org/homo_sapiens)

## Examples

```
data("grch38")  
head(grch38)
```

---

|                |                                   |
|----------------|-----------------------------------|
| grch38_tx2gene | <i>Human transcripts to genes</i> |
|----------------|-----------------------------------|

---

**Description**

Lookup table for converting Human (*Homo sapiens*) Ensembl transcript IDs to gene IDs based on genome assembly GRCH38 from Ensembl.

**Usage**

```
grch38_tx2gene
```

**Format**

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 277081 rows and 2 columns.

**Details**

Variables:

- `enstxp`
- `ensgene`

**Source**

[http://ensembl.org/homo\\_sapiens](http://ensembl.org/homo_sapiens)

**Examples**

```
data(grch38_tx2gene)
head(grch38_tx2gene)
```

---

|                         |                                              |
|-------------------------|----------------------------------------------|
| human_to_mouse_homologs | <i>Gene Homologs Between Human and Mouse</i> |
|-------------------------|----------------------------------------------|

---

**Description**

Homologs drawn from Biomart

**Usage**

```
human_to_mouse_homologs
```

**Format**

A data frame with 23188 rows and 2 columns

**HGNC.symbol** human gene symbols

**MGI.symbol** mouse gene symbols ...

**Source**

bioMart

---

|                 |                                                |
|-----------------|------------------------------------------------|
| list_plot_types | <i>Collate list of variables to be plotted</i> |
|-----------------|------------------------------------------------|

---

**Description**

Collate list of variables to be plotted

**Usage**

```
list_plot_types(object)
```

**Arguments**

|        |                               |
|--------|-------------------------------|
| object | a SingleCellExperiment object |
|--------|-------------------------------|

**Value**

plot\_types a list of category\_vars or continuous\_vars

**Examples**

```
data(small_example_dataset)
list_plot_types(small_example_dataset)
```

---

|                          |                                                                   |
|--------------------------|-------------------------------------------------------------------|
| load_alabaster_from_proj | <i>Load SingleCellExperiment Files from a single project path</i> |
|--------------------------|-------------------------------------------------------------------|

---

**Description**

Load SingleCellExperiment Files from a single project path

**Usage**

```
load_alabaster_from_proj(proj_dir, ...)
```

**Arguments**

|          |                                          |
|----------|------------------------------------------|
| proj_dir | project directory                        |
| ...      | extra args passed to load_alabaster_path |

**Value**

a SingleCellExperiment object

---

|                     |                                                                 |
|---------------------|-----------------------------------------------------------------|
| load_alabaster_path | <i>Read in Gene and Transcript SingleCellExperiment Objects</i> |
|---------------------|-----------------------------------------------------------------|

---

**Description**

Read in Gene and Transcript SingleCellExperiment Objects

**Usage**

```
load_alabaster_path(proj_dir = getwd(), prefix = "unfiltered")
```

**Arguments**

|          |                           |
|----------|---------------------------|
| proj_dir | path to project directory |
| prefix   | default "unfiltered"      |

**Value**

a SingleCellExperiment object

---

|              |                     |
|--------------|---------------------|
| load_bigwigs | <i>Load Bigwigs</i> |
|--------------|---------------------|

---

**Description**

Load a tibble of bigwig file paths by cell id

**Usage**

```
load_bigwigs(object, bigwig_db = "~/cache/chevreul/bw-files.db")
```

**Arguments**

|           |                                 |
|-----------|---------------------------------|
| object    | A object                        |
| bigwig_db | Sqlite database of bigwig files |

**Value**

a vector of bigwigs file paths

---

|                |                             |
|----------------|-----------------------------|
| make_bigwig_db | <i>Make Bigwig Database</i> |
|----------------|-----------------------------|

---

**Description**

Make Bigwig Database

**Usage**

```
make_bigwig_db(
  new_project = NULL,
  cache_location = "~/cache/chevreul/",
  sqlite_db = "bw-files.db"
)
```

**Arguments**

|                |                                  |
|----------------|----------------------------------|
| new_project    | Project directory                |
| cache_location | Path to cache "~/cache/chevreul" |
| sqlite_db      | sqlite db containing bw files    |

**Value**

a sqlite database of bigwig files for cells in a SingleCellExperiment object

---

|                           |                                            |
|---------------------------|--------------------------------------------|
| make_chevreul_clean_names | <i>Clean Vector of chevreulShiny Names</i> |
|---------------------------|--------------------------------------------|

---

**Description**

Cleans names of objects provided in a vector form

**Usage**

```
make_chevreul_clean_names(myvec)
```

**Arguments**

|       |                          |
|-------|--------------------------|
| myvec | A vector of object names |
|-------|--------------------------|

**Value**

a clean vector of object names

**Examples**

```
data(small_example_dataset)
make_chevreul_clean_names(colnames(
  get_colData(small_example_dataset)))
```

---

|                     |                                     |
|---------------------|-------------------------------------|
| metadata_from_batch | <i>Retrieve Metadata from Batch</i> |
|---------------------|-------------------------------------|

---

### Description

Retrieve Metadata from Batch

### Usage

```
metadata_from_batch(
  batch,
  projects_dir = "/dataVolume/storage/single_cell_projects",
  db_path = "single-cell-projects.db"
)
```

### Arguments

|              |                     |
|--------------|---------------------|
| batch        | batch               |
| projects_dir | path to project dir |
| db_path      | path to .db file    |

### Value

a tibble with cell level metadata from a SingleCellExperiment object

---

|                    |                                                                            |
|--------------------|----------------------------------------------------------------------------|
| minimalChevreulApp | <i>Create a minimal chevreulShiny app using SingleCellExperiment input</i> |
|--------------------|----------------------------------------------------------------------------|

---

### Description

Create a minimal chevreulShiny app using SingleCellExperiment input

### Usage

```
minimalChevreulApp(
  single_cell_sce = NULL,
  appTitle = NULL,
  organism_type = "human",
  futureMb = 13000,
  db_name = "single-cell-projects.db"
)
```

### Arguments

|                 |                                                |
|-----------------|------------------------------------------------|
| single_cell_sce | a singlecell object                            |
| appTitle        | a title for the app                            |
| organism_type   | human or mouse                                 |
| futureMb        | the megabytes available for the future package |
| db_name         | a database of bigwig files                     |

**Value**

a minimal chevreulShiny app

**Examples**

```
if (interactive() ) {
  data("tiny_sce")
  minimalChevreulApp(tiny_sce)
}
```

---

|                 |                        |
|-----------------|------------------------|
| plotly_settings | <i>Plotly settings</i> |
|-----------------|------------------------|

---

**Description**

Change settings of a plotly plot

**Usage**

```
plotly_settings(plotly_plot, width = 600, height = 700)
```

**Arguments**

|             |                      |
|-------------|----------------------|
| plotly_plot | A plotly plot        |
| width       | Default set to '600' |
| height      | Default set to '700' |

**Value**

a plotly plot with settings changed

---

|                           |                                                                       |
|---------------------------|-----------------------------------------------------------------------|
| plot_gene_coverage_by_var | <i>Plot BigWig Coverage for Genes of Interest by a Given Variable</i> |
|---------------------------|-----------------------------------------------------------------------|

---

**Description**

Plot BigWig coverage for genes of interest colored by a given variable

**Usage**

```
plot_gene_coverage_by_var(
  genes_of_interest = "NRL",
  cell_metadata,
  bigwig_tbl,
  group_by = "batch",
  values_of_interest = NULL,
  organism = c("human", "mouse"),
  edb = NULL,
  heights = c(3, 1),
  scale_y = "log10",
  reverse_x = FALSE,
  start = NULL,
  end = NULL,
  summarize_transcripts = FALSE,
  ...
)
```

**Arguments**

|                                    |                                                                                                                                                                |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>genes_of_interest</code>     | Gene of interest                                                                                                                                               |
| <code>cell_metadata</code>         | a dataframe with cell metadata from object                                                                                                                     |
| <code>bigwig_tbl</code>            | a tibble with colnames "name", "bigWig", and "sample_id" matching the file-name, absolute path, and sample name of each cell in the <code>cell_metadata</code> |
| <code>group_by</code>              | Variable to color by                                                                                                                                           |
| <code>values_of_interest</code>    | values of interest                                                                                                                                             |
| <code>organism</code>              | human (default) or mouse                                                                                                                                       |
| <code>edb</code>                   | ensembl db object                                                                                                                                              |
| <code>heights</code>               | The heights of each row in the grid of plot                                                                                                                    |
| <code>scale_y</code>               | whether to scale coverage                                                                                                                                      |
| <code>reverse_x</code>             | whether to reverse x axis                                                                                                                                      |
| <code>start</code>                 | start coordinates                                                                                                                                              |
| <code>end</code>                   | end coordinates                                                                                                                                                |
| <code>summarize_transcripts</code> | whether to summarize transcript counts                                                                                                                         |
| <code>...</code>                   | extra arguments passed to <code>plotCoverageFromEnsemblDb</code>                                                                                               |

**Value**

a ggplot with coverage faceted by `group_by`

---

|                 |                                                  |
|-----------------|--------------------------------------------------|
| read_project_db | <i>Read a database of chevreulShiny projects</i> |
|-----------------|--------------------------------------------------|

---

**Description**

Reads database of chevreulShiny projects to a data frame

**Usage**

```
read_project_db(  
  cache_location = "~/cache/chevreul",  
  sqlite_db = "single-cell-projects.db",  
  verbose = TRUE  
)
```

**Arguments**

|                |                                  |
|----------------|----------------------------------|
| cache_location | Path to cache "~/cache/chevreul" |
| sqlite_db      | sqlite db                        |
| verbose        | print messages                   |

**Value**

a tibble with SingleCellExperiment objects

---

|          |                                            |
|----------|--------------------------------------------|
| save_sce | <i>Save object to /output/sce/_sce.rds</i> |
|----------|--------------------------------------------|

---

**Description**

Save object to /output/sce/\_sce.rds

**Usage**

```
save_sce(object, prefix = "unfiltered", proj_dir = getwd())
```

**Arguments**

|          |                               |
|----------|-------------------------------|
| object   | a SingleCellExperiment object |
| prefix   | a prefix for saving           |
| proj_dir | path to a project directory   |

**Value**

a path to an rds file containing a SingleCellExperiment object

---

|                       |                                           |
|-----------------------|-------------------------------------------|
| small_example_dataset | <i>Small example SingleCellExperiment</i> |
|-----------------------|-------------------------------------------|

---

**Description**

created with `scuttle::mockSCE`

**Usage**

```
small_example_dataset
```

**Format**

An SCE with 200 cells and 1000 genes

**Source**

`scuttle::mockSCE`

---

|                   |                              |
|-------------------|------------------------------|
| subset_by_colData | <i>Subset by new colData</i> |
|-------------------|------------------------------|

---

**Description**

Subset the object using new `colData`

**Usage**

```
subset_by_colData(colData_path, object)
```

**Arguments**

|                           |                                  |
|---------------------------|----------------------------------|
| <code>colData_path</code> | Path to new <code>colData</code> |
| <code>object</code>       | A object                         |

**Value**

a `SingleCellExperiment` object

---

`tiny_sce`*Tiny example SingleCellExperiment*

---

**Description**

subset to only NRL from `chevreuldata::human_gene_transcript_sce()`

**Usage**

```
tiny_sce
```

**Format**

An SCE with only expression of NRL gene and NRL transcripts

**Source**

```
chevreuldata::human_gene_transcript_sce()
```

---

`unite_metadata`*Unite metadata*

---

**Description**

Unite metadata

**Usage**

```
unite_metadata(object, group_bys)
```

**Arguments**

|                        |                                            |
|------------------------|--------------------------------------------|
| <code>object</code>    | A <code>SingleCellExperiment</code> object |
| <code>group_bys</code> | A feature or variable to combine           |

**Value**

a `SingleCellExperiment` object with Idents formed from concatenation of `group_bys`

**Examples**

```
data(small_example_dataset)
unite_metadata(small_example_dataset, "Mutation_Status")
```

---

|                   |                                                    |
|-------------------|----------------------------------------------------|
| update_project_db | <i>Update a database of chevreulShiny projects</i> |
|-------------------|----------------------------------------------------|

---

**Description**

Add new/update existing projects to the database by recursing fully

**Usage**

```
update_project_db(  
  projects_dir = NULL,  
  cache_location = "~/cache/chevreul",  
  sqlite_db = "single-cell-projects.db",  
  verbose = TRUE  
)
```

**Arguments**

|                |                                     |
|----------------|-------------------------------------|
| projects_dir   | The project directory to be updated |
| cache_location | Path to cache "~/cache/chevreul"    |
| sqlite_db      | sqlite db                           |
| verbose        | print messages                      |

**Value**

a sqlite database with SingleCellExperiment objects

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