Package 'taxadb'

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Description Creates a local database of many commonly used taxonomic authorities and provides functions that can quickly query this data.

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clean_names

Clean taxonomic names

Description

A utility to sanitize taxonomic names to increase probability of resolving names.

Usage

```
clean_names(
   names,
   fix_delim = TRUE,
   binomial_only = TRUE,
   remove_sp = TRUE,
   ascii_only = TRUE,
   lowercase = TRUE,
   remove_punc = FALSE
)
```

Arguments

names	a character vector of taxonomic names (usually species names)
fix_delim	Should we replace separators ., _, - with spaces? e.g. 'Homo.sapiens' becomes 'Homo sapiens'. logical, default TRUE.
binomial_only	Attempt to prune name to a binomial name, e.g. Genus and species (specific epithet), e.g. Homo sapiens sapiens becomes Homo sapiens. logical, default TRUE.
remove_sp	Should we drop unspecified species epithet designations? e.g. Homo sp. be- comes Homo (thus only matching against genus level ids). logical, default TRUE.
ascii_only	should we coerce strings to ascii characters? (see stringi::stri_trans_general())
lowercase	should names be coerced to lower-case to provide case-insensitive matching?
remove_punc	replace all punctuation but apostrophes with a space, remove apostrophes

Details

Current implementation is limited to handling a few common cases. Additional extensions may be added later. A goal of the clean_names function is that any modification rule of the name strings be precise, atomic, and toggle-able, rather than relying on clever but more opaque rules and arbitrary scores. This utility should always be used with care, as indiscriminate modification of names may result in successful but inaccurate name matching. A good pattern is to only apply this function to the subset of names that cannot be directly matched.

Examples

clean_names(c("Homo sapiens sapiens", "Homo.sapiens", "Homo sp."))

common_contains common name starts with

Description

common name starts with

Usage

```
common_contains(
   name,
   provider = getOption("taxadb_default_provider", "itis"),
   version = latest_version(),
   db = td_connect(),
   ignore_case = TRUE
)
```

Arguments

name	vector of names (scientific or common, see by) to be matched against.
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options (default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
db	a connection to the taxadb database. See details.
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.

Examples

common_contains("monkey")

common_starts_with common name starts with

Description

common name starts with

Usage

```
common_starts_with(
   name,
   provider = getOption("taxadb_default_provider", "itis"),
   version = latest_version(),
   db = td_connect(),
   ignore_case = TRUE
)
```

Arguments

name	vector of names (scientific or common, see by) to be matched against.
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
db	a connection to the taxadb database. See details.
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.

filter_by

Examples

```
common_starts_with("monkey")
```

filter_by Creates a data frame with column name given by by, and values given by the vector x, and then uses this table to do a filtering join, joining on the by column to return all rows matching the x values (scientific-Names, taxonIDs, etc).

Description

Creates a data frame with column name given by by, and values given by the vector x, and then uses this table to do a filtering join, joining on the by column to return all rows matching the x values (scientificNames, taxonIDs, etc).

Usage

```
filter_by(
    x,
    by,
    provider = getOption("taxadb_default_provider", "itis"),
    schema = c("dwc", "common"),
    version = latest_version(),
    collect = TRUE,
    db = td_connect(),
    ignore_case = FALSE
)
```

Arguments

х	a vector of values to filter on
by	a column name in the taxa_tbl (following Darwin Core Schema terms). The filtering join is executed with this column as the joining variable.
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
schema	One of "dwc" (for Darwin Core data) or "common" (for the Common names table.)
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
collect	logical, default TRUE. Should we return an in-memory data.frame (default, usu- ally the most convenient), or a reference to lazy-eval table on disk (useful for very large tables on which we may first perform subsequent filtering operations.)

Value

a data.frame in the Darwin Core tabular format containing the matching taxonomic entities.

See Also

```
Other filter_by: filter_common(), filter_id(), filter_name(), filter_rank()
```

Examples

```
sp <- c("Trochalopteron henrici gucenense",
                "Trochalopteron elliotii")
filter_by(sp, "scientificName")
filter_by(c("ITIS:1077358", "ITIS:175089"), "taxonID")
filter_by("Aves", "class")
```

filter_common Look up taxonomic information by common name

Description

Look up taxonomic information by common name

Usage

```
filter_common(
   name,
   provider = getOption("taxadb_default_provider", "itis"),
   version = latest_version(),
   collect = TRUE,
   ignore_case = TRUE,
   db = td_connect()
)
```

filter_id

Arguments

name	a character vector of common (vernacular English) names, e.g. "Humans"
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
collect	logical, default TRUE. Should we return an in-memory data.frame (default, usu- ally the most convenient), or a reference to lazy-eval table on disk (useful for very large tables on which we may first perform subsequent filtering operations.)
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.
db	a connection to the taxadb database. See details.

Value

a data.frame in the Darwin Core tabular format containing the matching taxonomic entities.

See Also

Other filter_by: filter_by(), filter_id(), filter_name(), filter_rank()

Examples

filter_common("Pied Tamarin")

filter_id

Return a taxonomic table matching the requested ids

Description

Return a taxonomic table matching the requested ids

filter_id

Usage

```
filter_id(
    id,
    provider = getOption("taxadb_default_provider", "itis"),
    type = c("taxonID", "acceptedNameUsageID"),
    version = latest_version(),
    collect = TRUE,
    db = td_connect()
)
```

Arguments

id	taxonomic id, in prefix format
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
type	id type. Can be taxonID or acceptedNameUsageID, see details.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
collect	logical, default TRUE. Should we return an in-memory data.frame (default, usu- ally the most convenient), or a reference to lazy-eval table on disk (useful for very large tables on which we may first perform subsequent filtering operations.)
db	a connection to the taxadb database. See details.

Details

Use type="acceptedNameUsageID" to return all rows for which this ID is the accepted ID, including both synonyms and and accepted names (since both all synonyms of a name share the same acceptedNameUsageID.) Use taxonID (default) to only return those rows for which the Scientific name corresponds to the taxonID.

Some providers (e.g. ITIS) assign taxonIDs to synonyms, most others only assign IDs to accepted names. In the latter case, this means requesting taxonID will only match accepted names, while requesting matches to the acceptedNameUsageID will also return any known synonyms. See examples.

Value

a data.frame with id and name of all matching species

See Also

Other filter_by: filter_by(), filter_common(), filter_name(), filter_rank()

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filter_name

Examples

```
filter_id(c("ITIS:1077358", "ITIS:175089"))
filter_id("ITIS:1077358", type="acceptedNameUsageID")
```

filter_name

```
Look up taxonomic information by scientific name
```

Description

Look up taxonomic information by scientific name

Usage

```
filter_name(
   name,
   provider = getOption("taxadb_default_provider", "itis"),
   version = latest_version(),
   collect = TRUE,
   ignore_case = FALSE,
   db = td_connect()
)
```

Arguments

name	a character vector of scientific names, e.g. "Homo sapiens"
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options (default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
collect	logical, default TRUE. Should we return an in-memory data.frame (default, usu- ally the most convenient), or a reference to lazy-eval table on disk (useful for very large tables on which we may first perform subsequent filtering operations.)
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.
db	a connection to the taxadb database. See details.

Details

Most but not all authorities can match against both species level and higher-level (or lower, e.g. subspecies or variety) taxonomic names. The rank level is indicated by taxonRank column.

Most authorities include both known synonyms and accepted names in the scientificName column, (with the status indicated by taxonomicStatus). This is convenient, as users will typically not know if the names they have are synonyms or accepted names, but will want to get the match to the accepted name and accepted ID in either case.

Value

a data.frame in the Darwin Core tabular format containing the matching taxonomic entities.

See Also

Other filter_by: filter_by(), filter_common(), filter_id(), filter_rank()

Examples

filter_rank

Get all members (descendants) of a given rank level

Description

Get all members (descendants) of a given rank level

Usage

```
filter_rank(
    name,
    rank,
    provider = getOption("taxadb_default_provider", "itis"),
    version = latest_version(),
    collect = TRUE,
    ignore_case = TRUE,
    db = td_connect()
)
```

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fuzzy_filter

Arguments

name	taxonomic scientific name (e.g. "Aves")
rank	taxonomic rank name. (e.g. "class")
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
collect	logical, default TRUE. Should we return an in-memory data.frame (default, usu- ally the most convenient), or a reference to lazy-eval table on disk (useful for very large tables on which we may first perform subsequent filtering operations.)
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.
db	a connection to the taxadb database. See details.

Value

a data.frame in the Darwin Core tabular format containing the matching taxonomic entities.

See Also

Other filter_by: filter_by(), filter_common(), filter_id(), filter_name()

Examples

filter_rank("Aves", "class")

fuzzy_filter

Match names that start or contain a specified text string

Description

Match names that start or contain a specified text string

Usage

```
fuzzy_filter(
   name,
   by = c("scientificName", "vernacularName"),
   provider = getOption("taxadb_default_provider", "itis"),
   match = c("contains", "starts_with"),
   version = latest_version(),
   db = td_connect(),
   ignore_case = TRUE,
   collect = TRUE
)
```

Arguments

name	vector of names (scientific or common, see by) to be matched against.
by	a column name in the taxa_tbl (following Darwin Core Schema terms). The filtering join is executed with this column as the joining variable.
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
match	should we match by names starting with the term or containing the term any- where in the name?
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
db	a connection to the taxadb database. See details.
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.
collect	logical, default TRUE. Should we return an in-memory data.frame (default, usu- ally the most convenient), or a reference to lazy-eval table on disk (useful for very large tables on which we may first perform subsequent filtering operations.)

Details

Note that fuzzy filter will be fast with an single or small number of names, but will be slower if given a very large vector of names to match, as unlike other filter_ commands, fuzzy matching requires separate SQL calls for each name. As fuzzy matches should all be confirmed manually in any event, e.g. not every common name containing "monkey" belongs to a primate species.

This method utilizes the database operation %like% to filter tables without loading into memory. Note that this does not support the use of regular expressions at this time.

Examples

```
## match any common name containing:
name <- c("woodpecker", "monkey")</pre>
```

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get_ids

get_ids

get_ids

Description

A drop-in replacement for [taxize::get_ids()]

Usage

```
get_ids(
  names,
  provider = getOption("taxadb_default_provider", "itis"),
  format = c("prefix", "bare", "uri"),
  version = latest_version(),
  taxadb_db = td_connect(),
  ignore_case = FALSE,
  warn = TRUE,
  db = NULL,
  ...
)
```

Arguments

names	a list of scientific names (which may include higher-order ranks in most author- ities).
provider	abbreviation code for the provider. See details.
format	Format for the returned identifier, one of
	• prefix (e.g. NCBI: 9606, the default), or
	 bare (e.g. 9606, used in taxize::get_ids()),
	 uri (e.g. http://ncbi.nlm.nih.gov/taxonomy/9606).
version	Which version of the taxadb provider database should we use? defaults to latest.
	see [avialable_releases()] for details.
taxadb_db	Connection to from [td_connect()].
ignore_case	should we ignore case (capitalization) in matching names? default is TRUE.
warn	should we display warnings on NAs resulting from multiply-resolved matches? (Unlike unmatched names, these NAs can usually be resolved manually via filter_id())
db	previous name for provider argument, now deprecated
	additional arguments (currently ignored)

Details

Note that some taxize authorities: nbn, tropicos, and eol, are not recognized by taxadb and will throw an error here. Meanwhile, taxadb recognizes several authorities not known to [taxize::get_ids()]. Both include itis, ncbi, col, and gbif.

Like all taxadb functions, this function will run fastest if a local copy of the provider is installed in advance using [td_create()].

Value

a vector of IDs, of the same length as the input names Any unmatched names or multiply-matched names will return as NAs. To resolve multi-matched names, use [filter_name()] instead to return a table with a separate row for each separate match of the input name.

See Also

filter_name

Other get: get_names()

Examples

```
get_ids("Midas bicolor")
get_ids(c("Midas bicolor", "Homo sapiens"), format = "prefix")
get_ids("Midas bicolor", format = "uri")
```

get_names

get_names

Description

Translate identifiers into scientific names

Usage

```
get_names(
    id,
    provider = getOption("taxadb_default_provider", "itis"),
    version = latest_version(),
    format = c("guess", "prefix", "bare", "uri"),
```

```
taxadb_db = td_connect(),
db = NULL
)
```

Arguments

id	a list of taxonomic identifiers.
provider	abbreviation code for the provider. See details.
version	Which version of the taxadb provider database should we use? defaults to latest. see [avialable_releases()] for details.
format	Format for the returned identifier, one of
	 prefix (e.g. NCBI:9606, the default), or bare (e.g. 9606, used in taxize::get_ids()), uri (e.g. http://ncbi.nlm.nih.gov/taxonomy/9606).
taxadb_db	Connection to from [td_connect()].
db	previous name for provider argument, now deprecated

Details

Like all taxadb functions, this function will run fastest if a local copy of the provider is installed in advance using [td_create()].

Value

a vector of names, of the same length as the input ids. Any unmatched IDs will return as NAs.

See Also

Other get: get_ids()

Examples

get_names(c("ITIS:1025094", "ITIS:1025103"), format = "prefix")

name_contains

Description

return all taxa in which scientific name contains the text provided

Usage

```
name_contains(
   name,
   provider = getOption("taxadb_default_provider", "itis"),
   version = latest_version(),
   db = td_connect(),
   ignore_case = TRUE
)
```

Arguments

name	vector of names (scientific or common, see by) to be matched against.
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options (default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
db	a connection to the taxadb database. See details.
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.

Examples

name_contains("Chera")

name_starts_with scientific name starts with

Description

scientific name starts with

taxadb_dir

Usage

```
name_starts_with(
   name,
   provider = getOption("taxadb_default_provider", "itis"),
   version = latest_version(),
   db = td_connect(),
   ignore_case = TRUE
)
```

Arguments

name	vector of names (scientific or common, see by) to be matched against.
provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options (default_taxadb_provider="). See [td_create] for a list of recognized providers.
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
db	a connection to the taxadb database. See details.
ignore_case	should we ignore case (capitalization) in matching names? Can be significantly slower to run.

Examples

name_starts_with("Chera")

taxadb_dir

Show the taxadb directory

Description

Show the taxadb directory

Usage

```
taxadb_dir()
```

Details

NOTE: after upgrading duckdb, a user may need to delete any existing databases created with the previous version. An efficient way to do so is unlink(taxadb::taxadb_dir(), TRUE).

Examples

```
## show the directory
taxadb_dir()
## Purge the local db
unlink(taxadb::taxadb_dir(), TRUE)
```

```
taxa_tbl
```

```
Return a reference to a given table in the taxadb database
```

Description

Return a reference to a given table in the taxadb database

Usage

```
taxa_tbl(
  provider = getOption("taxadb_default_provider", "itis"),
  schema = c("dwc", "common"),
  version = latest_version(),
  db = td_connect()
)
```

Arguments

provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options(default_taxadb_provider="). See [td_create] for a list of recognized providers.
schema	One of "dwc" (for Darwin Core data) or "common" (for the Common names table.)
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
db	a connection to the taxadb database. See details.

Examples

```
## default schema is the dwc table
taxa_tbl()
```

```
## common names table
taxa_tbl(schema = "common")
```

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td_connect

Description

Connect to the taxadb database

Usage

td_connect(dbdir = NULL, driver = NULL, read_only = NULL)

Arguments

dbdir	Path to the database. no longer needed
driver	deprecated, ignored. driver will always be duckdb.
read_only	deprecated, driver is always read-only.

Details

This function provides a default database connection for taxadb. Note that you can use taxadb with any DBI-compatible database connection by passing the connection object directly to taxadb functions using the db argument. td_connect() exists only to provide reasonable automatic defaults based on what is available on your system.

For performance reasons, this function will also cache and restore the existing database connection, making repeated calls to td_connect() much faster and more failsafe than repeated calls to DBI::dbConnect

Value

Returns a DBI connection to the default duckdb database

Examples

```
## OPTIONAL: you can first set an alternative home location,
## such as a temporary directory:
Sys.setenv(TAXADB_HOME=file.path(tempdir(), "taxadb"))
```

```
## Connect to the database:
db <- td_connect()</pre>
```

td_create

Description

create a local taxonomic database

Usage

```
td_create(
   provider = getOption("taxadb_default_provider", "itis"),
   schema = c("dwc", "common"),
   version = latest_version(),
   overwrite = NULL,
   lines = NULL,
   dbdir = NULL,
   db = td_connect()
)
```

Arguments

provider	a list (character vector) of provider(s) to be included in the database. By default, will install itis. See details for a list of recognized provider. available provider automatically.
schema	One of "dwc" (for Darwin Core data) or "common" (for the Common names table.)
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
overwrite	Should we overwrite existing tables? Default is TRUE. Change to "ask" for inter- active interface, or TRUE to force overwrite (i.e. updating a local database upon new release.)
lines	number of lines that can be safely read in to memory at once. Leave at default or increase for faster importing if you have plenty of spare RAM.
dbdir	a location on your computer where the database should be installed. Defaults to user data directory given by [tools::R_user_dir()].
db	connection to a database. By default, taxadb will set up its own fast database connection.

Details

Authorities currently recognized by taxadb are:

- itis: Integrated Taxonomic Information System, https://www.itis.gov
- ncbi: National Center for Biotechnology Information, https://www.ncbi.nlm.nih.gov/ taxonomy

td_disconnect

- col: Catalogue of Life, http://www.catalogueoflife.org/
- gbif: Global Biodiversity Information Facility, https://www.gbif.org/
- ott: OpenTree Taxonomy: https://github.com/OpenTreeOfLife/reference-taxonomy
- iucn: IUCN Red List, https://iucnredlist.org
- itis_test: a small subset of ITIS, cached locally with the package for testing purposes only

Value

path where database has been installed (invisibly)

Examples

```
## Install the ITIS database
td_create()
## force re-install:
td_create( overwrite = TRUE)
```

td_disconnect Disconnect from the taxadb database.

Description

Disconnect from the taxadb database.

Usage

```
td_disconnect(db = td_connect())
```

Arguments

db database connection

Details

This function manually closes a connection to the taxadb database.

Examples

Disconnect from the database: td_disconnect() tl_import

Description

Downloads the requested taxonomic data tables and return a local path to the data in tsv.gz format. Downloads are cached and identified by content hash so that tl_import will not attempt to download the same file multiple times.

Usage

```
tl_import(
    provider = getOption("tl_default_provider", "itis"),
    schema = c("dwc", "common"),
    version = latest_version(),
    prov = prov_cache()
)
```

Arguments

provider	from which provider should the hierarchy be returned? Default is 'itis', which can also be configured using options (default_taxadb_provider="). See [td_create] for a list of recognized providers.
schema	One of "dwc" (for Darwin Core data) or "common" (for the Common names table.)
version	Which version of the taxadb provider database should we use? defaults to latest. See tl_import for details.
prov	Address (URL) to provenance record

Details

tl_import parses a schema.org record to determine the correct version to download. If offline, tl_import will attempt to resolve against it's own provenance cache. Users can also examine / parse the prov JSON-LD file directly to determine the provenance of the data products used.

Value

path(s) to the downloaded files in the cache

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