

Package: ritalic (via r-universe)

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Title Interface to the ITALIC Database of Lichen Biodiversity

Version 0.10.2

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Description A programmatic interface to the Web Service methods provided by ITALIC (<<https://italic.units.it>>). ITALIC is a database of lichen data in Italy and bordering European countries. 'ritalic' includes functions for retrieving information about lichen scientific names, geographic distribution, ecological data, morpho-functional traits and identification keys. More information about the data is available at <<https://italic.units.it/?procedure=base&t=59&c=60>>. The API documentation is available at <<https://italic.units.it/?procedure=api>>.

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Suggests knitr, rmarkdown, testthat (>= 3.0.0)

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URL <https://github.com/plant-data/ritalic>

BugReports <https://github.com/plant-data/ritalic/issues>

Depends R (>= 3.5.3)

Imports httr, jsonlite, utils

Config/pak/sysreqs libssl-dev

Repository <https://plant-data.r-universe.dev>

RemoteUrl <https://github.com/plant-data/ritalic>

RemoteRef HEAD

RemoteSha 1cd6ddf21f896d90ff9a178d0e6ab1dbdfe072d5

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italic_checklist	<i>Get the list of species names in the checklist of the lichens of Italy</i>
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Description

Retrieves the complete list of accepted scientific names from the Checklist of the Lichens of Italy in ITALIC. The function returns all accepted names of species occurring in Italy and in bordering countries

Usage

```
italic_checklist(
  genus = NULL,
  family = NULL,
  order = NULL,
  class = NULL,
  phylum = NULL
)
```

Arguments

genus	Optional. A genus name to filter the checklist.
family	Optional. A family name to filter the checklist.
order	Optional. An order name to filter the checklist.
class	Optional. A class name to filter the checklist.
phylum	Optional. A phylum name to filter the checklist.

Value

A character vector containing all accepted scientific names from the checklist of ITALIC.

References

ITALIC - The Information System on Italian Lichens: National Checklist <https://italic.units.it/index.php?procedure=checklist>

Examples

```
## Not run:  
# Get the complete checklist  
checklist <- italic_checklist()  
# Get the checklist of the species of genus Lecanora  
check_lecanora <- italic_checklist(genus = "Lecanora")  
  
## End(Not run)
```

italic_description *Get descriptions of lichen taxa*

Description

Retrieves the morphological description and additional taxonomic or ecological notes about lichen taxa present in the Checklist of the Lichens of Italy. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_description(sp_names)
```

Arguments

sp_names Character vector of accepted names

Value

A data frame with columns:

scientific_name Scientific name

description Morphological description

notes Additional taxonomic or ecological information

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `descriptions <- italic_description(names_matched$accepted)`

Examples

```
## Not run:
italic_description("Cetraria islandica (L.) Ach. subsp. islandica")

## End(Not run)
```

`italic_ecology_traits` *Get ecology data and morphological traits of lichen taxa*

Description

Retrieves morpho-functional traits, ecological indicators, altitudinal distribution, and poleotolerance data for lichen taxa. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_ecology_traits(sp_names)
```

Arguments

`sp_names` Character vector of accepted names

Value

A data frame with:

scientific_name Scientific name
substrata Substrate
photobiont Type of photosynthetic partner
growth_form Growth form
phytoclimatic_range Distribution in vegetation zones
special_requirements_for_water Water requirements
reproductive_strategy Main reproductive methods
ph_of_the_substrata_min Minimum pH value (1-5 scale)
ph_of_the_substrata_max Maximum pH value (1-5 scale)
solar_irradiation_min Minimum light requirements (1-5 scale)
solar_irradiation_max Maximum light tolerance (1-5 scale)
aridity_min Minimum aridity tolerance (1-5 scale)
aridity_max Maximum aridity tolerance (1-5 scale)
eutrophication_min Minimum nutrient requirements (1-5 scale)
eutrophication_max Maximum nutrient tolerance (1-5 scale)

altitudinal_distribution_min Minimum altitude zone (1-6 scale)

altitudinal_distribution_max Maximum altitude zone (1-6 scale)

poleotolerance_min Minimum poleotolerance level (1-5 scale)

poleotolerance_max Maximum poleotolerance level (1-5 scale)

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `data <- italic_ecology_traits(names_matched$accepted_names)`

References

ITALIC - The Information System on Italian Lichens: data about taxa <https://italic.units.it/?procedure=base&t=59&c=60#otherdata>

Examples

```
## Not run:
traits <- italic_ecology_traits("Cetraria islandica (L.) Ach. subsp. islandica")

## End(Not run)
```

italic_ecoregions_distribution

Get distribution of lichen taxa across Italian ecoregions

Description

Returns the distribution and commonness status of lichen taxa across Italian ecoregions. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_ecoregions_distribution(sp_names, result_data = "rarity")
```

Arguments

<code>sp_names</code>	Character vector of accepted names
<code>result_data</code>	Character string specifying the output format: "rarity" (default) returns commonness/rarity categories, "presence-absence" returns only values for presence/absence (0/1)

Value

A data frame with:

scientific_name Scientific name with authorities

alpine Status in alpine belt (extremely common to absent)

subalpine Status in subalpine belt (extremely common to absent)

oromediterranean Status in oromediterranean belt (extremely common to absent)

montane Status in montane belt (extremely common to absent)

dry_submediterranean Status in dry submediterranean belt (extremely common to absent)

padanian Status in padanian belt (extremely common to absent)

humid_submediterranean Status in humid submediterranean belt (extremely common to absent)

humid_mediterranean Status in humid mediterranean belt (extremely common to absent)

dry_mediterranean Status in dry mediterranean belt (extremely common to absent)

The possible values of commonness/rarity are: "extremely common", "very common", "common", "rather common", "rather rare", "rare", "very rare", "extremely rare", "absent"

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names) ecoregions_distribution <- italic_ecoregions_distribution(names_matched)`

References

ITALIC - The Information System on Italian Lichens: ecoregions distribution <https://italic.units.it/?procedure=base&t=59&c=60#commonness>

Examples

```
## Not run:
# Get commonness/rarity categories
ecodist <- italic_ecoregions_distribution("Cetraria ericetorum Opiz")

# Get presence/absence data
edist <- italic_ecoregions_distribution("Cetraria ericetorum Opiz", "presence-absence")

## End(Not run)
```

`italic_identification_key`*Generate interactive identification keys for lichen taxa*

Description

Creates a custom interactive dichotomous key for identifying the specified lichen taxa using the KeyMaker system of ITALIC. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_identification_key(sp_names)
```

Arguments

`sp_names` Character vector of accepted names

Value

Character string containing URL to a web-based interactive identification key. The key is uniquely generated for the input taxa and allows step-by-step identification through dichotomous choices.

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `key_url <- italic_identification_key(names_matched$accepted_names)`

References

ITALIC - The KeyMaker <https://italic.units.it/key-maker/>

Examples

```
## Not run:
# Generate key for two species
italic_identification_key(c("Cetraria ericetorum Opiz", "Xanthoria parietina (L.) Th. Fr. "))

## End(Not run)
```

 italic_match

 Match lichen scientific names against the database of ITALIC

Description

Aligns scientific names of lichens against the Checklist of the Lichens of Italy available in ITALIC database. The function handles infraspecific ranks (subspecies, varieties, forms) and returns detailed matching information including nomenclatural status and matching scores.

Usage

```
italic_match(sp_names, subsp_marks = c(), var_marks = c(), form_marks = c())
```

Arguments

sp_names	A character vector of scientific names to match
subsp_marks	Character vector of markers used to indicate uncommon subspecies rank in the input names (different from "subsp.", "ssp."). For example, to match "Pseudevernia furfuracea b) ceratea", you need to pass "b)" as subsp_mark
var_marks	Character vector of markers used to indicate uncommon variety rank in the input names (different from "var.", "v."). For example, to match "Acarospora sulphurata varietas rubescens", you need to pass "varietas" as var_mark
form_marks	Character vector of markers used to indicate uncommon form rank in the input names (different from "f.", "form"). For example, to match "Verrucaria nigrescens fo. tectorum", you need to pass "fo." as form_mark

Value

A data frame with the following columns:

input_name Original scientific name provided
matched_name Name matched in ITALIC database
status Nomenclatural status ("accepted" or "synonym")
accepted_name Currently accepted name in ITALIC
name_score Matching score for the name part (0-100)
auth_score Matching score for the authority part (0-100)

Examples

```
## Not run:
# Simple name matching
result <- italic_match("Cetraria islandica")

# Name matching with spelling mistakes
result <- italic_match("Xantoria parietina")
```



```
# Matching with uncommon marker
result <- italic_match("Acarospora sulphurata varietas rubescens",
                      var_marks = "varietas")

# Matching multiple names
result <- c("Cetraria islandica", "Xanthoria parietina")

## End(Not run)
```

italic_occurrences *Get occurrence records for lichen taxa*

Description

Retrieves occurrence records from Italian herbarium collections for specified lichen taxa. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_occurrences(sp_names, result_data = "simple")
```

Arguments

`sp_names` Character vector of accepted names
`result_data` Character string specifying output detail level: "simple" (default) or "extended"

Value

A data frame with occurrence records. Column names follow the Darwin Core standard, with the additional column `substratum`, which is particularly relevant for lichens. For simple output:

scientificName Full scientific name
decimalLatitude Latitude in decimal degrees
decimalLongitude Longitude in decimal degrees
coordinatesUncertaintyInMeters Spatial uncertainty of the coordinates
substratum Substrate on which the specimen was found
institutionCode Code of the herbarium holding the specimen
eventDate Collection date

Extended output adds:

locality Collection locality
catalogNumber Specimen identifier in the collection
minimumElevationInMeters Lower limit of the elevation range
maximumElevationInMeters Upper limit of the elevation range
verbatimIdentification Scientific name reported on the original label
identifiedBy Person who identified the specimen

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `occ <- italic_occurrences(names_matched$accepted_name)`

References

ITALIC - The Information System on Italian Lichens <https://italic.units.it>

Examples

```
## Not run:
# Get simple occurrence data
occ <- italic_occurrences("Cetraria ericetorum Opiz")

# Get extended occurrence data
occ_ext <- italic_occurrences("Cetraria ericetorum Opiz", result_data = "extended")

## End(Not run)
```

`italic_occurrences_references`

Get scientific references for occurrence data

Description

Retrieves bibliographic references and DOIs for scientific publications describing occurrence datasets from specific herbarium collections.

Usage

```
italic_occurrences_references(occurrences_dataframe)
```

Arguments

`occurrences_dataframe`

Data frame containing occurrence records, must include an 'institutionCode' column

Value

A data frame with two columns:

reference Full bibliographic citation of the publication

doi Digital Object Identifier URL

Examples

```
## Not run:
# Get occurrences first
occ <- italic_occurrences("Cetraria ericetorum Opiz")

# Then get associated references
refs <- italic_occurrences_references(occ)

## End(Not run)
```

italic_regions_distribution

Get distribution of lichen taxa in Italy

Description

Retrieves presence/absence data (1/0) for lichen taxa across all the Italian administrative regions. Only accepts accepted names from the ITALIC database. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_regions_distribution(sp_names)
```

Arguments

sp_names Character vector of accepted names from ITALIC database

Value

A data frame with columns:

scientific_name Scientific name
abruzzo Presence (1) or absence (0) in Abruzzo
basilicata Presence (1) or absence (0) in Basilicata
calabria Presence (1) or absence (0) in Calabria
campania Presence (1) or absence (0) in Campania
emilia_romagna Presence (1) or absence (0) in Emilia Romagna
friuli_venezia_giulia Presence (1) or absence (0) in Friuli Venezia-Giulia
lazio Presence (1) or absence (0) in Lazio
liguria Presence (1) or absence (0) in Liguria
lombardia Presence (1) or absence (0) in Lombardia
marche Presence (1) or absence (0) in Marche

molise Presence (1) or absence (0) in Molise
piemonte Presence (1) or absence (0) in Piemonte
puglia Presence (1) or absence (0) in Puglia
sardegna Presence (1) or absence (0) in Sardegna
sicilia Presence (1) or absence (0) in Sicilia
toscana Presence (1) or absence (0) in Toscana
trentino_alto_adige Presence (1) or absence (0) in Trentino Alto-Adige
umbria Presence (1) or absence (0) in Umbria
valle_d_aosta Presence (1) or absence (0) in Valle d'Aosta
veneto Presence (1) or absence (0) in Veneto

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `distribution <- italic_distribution(names_matched$accepted_name)`

Examples

```
## Not run:
# First match names
matched <- italic_match("Cetraria islandica")
# Then get distribution in administrative regions
italic_regions_distribution(matched$accepted_name)

## End(Not run)
```

`italic_taxonomy`

Get taxonomic classification of lichen taxa

Description

Retrieves the complete taxonomic hierarchy for lichen taxa from the ITALIC database. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_taxonomy(sp_names)
```

Arguments

`sp_names` Character vector of accepted names

Value

A data frame with:

scientific_name Scientific name

phylum Phylum

class Class

order Order

family Family

genus Genus

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `taxonomy <- italic_taxonomy(names_matched$accepted_`

Examples

```
## Not run:
taxonomy <- italic_taxonomy("Cetraria islandica (L.) Ach. subsp. islandica")

## End(Not run)
```

`italic_taxon_data` *Get data of lichen taxa*

Description

This function returns a dataframe containing taxonomy, ecology_traits, regions_distribution, ecoregions_distribution of the lichen species passed as input. For more info about these parameters see <https://italic.units.it/?procedure=base&t=59&c=60#otherdata> Only accepts names that exist in the database of ITALIC.

Usage

```
italic_taxon_data(sp_names)
```

Arguments

`sp_names` A vector containing the scientific names of the lichen species.

Value

A dataframe containing the classification, description, ecology and rarity of the lichen species passed as input.

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `descriptions <- italic_taxon_data(names_matched$accepted_`

Examples

```
italic_taxon_data(c("Cetraria ericetorum Opiz", "Lecanora cenisia Ach."))
```

`italic_traits_pa` *Get a presence-absence matrix of lichen traits*

Description

This function returns the functional traits of the lichen species passed as input. Only accepts names that exist in the database of ITALIC.

Usage

```
italic_traits_pa(sp_names)
```

Arguments

`sp_names` A vector containing scientific names of lichens.

Value

A dataframe containing the ecology of the lichen species passed as input.

Note

Before using this function with a list of names, first obtain their accepted names using `italic_match()`.

Example workflow: `names_matched <- italic_match(your_names)` `descriptions <- italic_taits_pa(names_matched$accepted_`

Examples

```
italic_traits_pa("Cetraria ericetorum Opiz")
```

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