

# Package ‘spocc’

November 15, 2018

**Title** Interface to Species Occurrence Data Sources

**Description** A programmatic interface to many species occurrence data sources, including Global Biodiversity Information Facility ('GBIF'), 'USGSs' Biodiversity Information Serving Our Nation ('BISON'), 'iNaturalist', Berkeley 'Ecoinformatics' Engine, 'eBird', Integrated Digitized 'Biocollections' ('iDigBio'), 'VertNet', Ocean 'Biogeographic' Information System ('OBIS'), and Atlas of Living Australia ('ALA'). Includes functionality for retrieving species occurrence data, and combining those data.

**Version** 0.9.0

**License** MIT + file LICENSE

**URL** <https://github.com/ropensci/spocc>

**BugReports** <https://github.com/ropensci/spocc/issues>

**LazyData** true

**VignetteBuilder** knitr

**Encoding** UTF-8

**Language** en-US

**Imports** utils, rgbif (>= 1.0.0), rbison (>= 0.6.0), rebird (>= 1.0.0), rvertnet (>= 0.7.0), ridigbio (>= 0.3.5), lubridate (>= 1.5.0), crul (>= 0.3.4), whisker (>= 0.3-2), jsonlite (>= 1.4), data.table (>= 1.9.6), tibble (>= 1.2), wicket (>= 0.3.0)

**Suggests** roxygen2 (>= 6.1.1), testthat, knitr, taxize (>= 0.8.4)

**RoxygenNote** 6.1.1

**NeedsCompilation** no

**Author** Scott Chamberlain [aut, cre] (<<https://orcid.org/0000-0003-1444-9135>>),  
Karthik Ram [ctb],  
Ted Hart [ctb],  
rOpenSci [fnd] (<https://ropensci.org/>)

**Maintainer** Scott Chamberlain <[myrmecocystus@gmail.com](mailto:myrmecocystus@gmail.com)>

**Repository** CRAN

**Date/Publication** 2018-11-15 06:40:03 UTC

## R topics documented:

spocc-package . . . . .	2
as.ala . . . . .	3
as.bison . . . . .	4
as.ecoengine . . . . .	5
as.gbif . . . . .	6
as.idigbio . . . . .	7
as.inat . . . . .	8
as.obis . . . . .	9
as.vertnet . . . . .	10
bbox2wkt . . . . .	11
fixnames . . . . .	12
inspect . . . . .	13
occ . . . . .	15
occ2df . . . . .	27
occ_names . . . . .	28
occ_names_options . . . . .	30
occ_options . . . . .	31
spocc_duplicates . . . . .	32
wkt_vis . . . . .	32
<b>Index</b>	<b>34</b>

---

spocc-package	<i>Interface to many species occurrence data sources</i>
---------------	--

---

### Description

A programmatic interface to many species occurrence data sources, including GBIF, USGS's BISON, iNaturalist, Berkeley Ecoinformatics Engine, eBird, iDigBio, VertNet, OBIS, and ALA. Includes functionality for retrieving species occurrence data, and combining that data.

### Package API

The main function to use is `occ()` - a single interface to many species occurrence databases (see below for a list).

Other functions include:

- `occ2df()` - Combine results from `occ` into a `data.frame`
- `fixnames()` - Change names to be the same for each taxon
- `wkt_vis()` - Visualize WKT strings (used to define geometry based searches for some data sources) in an interactive map

### Currently supported species occurrence data sources

Provider	Web
GBIF	<a href="http://www.gbif.org/">http://www.gbif.org/</a>
BISON	<a href="https://bison.usgs.gov/">https://bison.usgs.gov/</a>
eBird	<a href="http://ebird.org/content/ebird/">http://ebird.org/content/ebird/</a>
iNaturalist	<a href="http://www.inaturalist.org/">http://www.inaturalist.org/</a>
Berkeley ecoengine	<a href="https://ecoengine.berkeley.edu/">https://ecoengine.berkeley.edu/</a>
VertNet	<a href="http://vertnet.org/">http://vertnet.org/</a>
iDigBio	<a href="https://www.idigbio.org/">https://www.idigbio.org/</a>
OBIS	<a href="http://www.iobis.org/">http://www.iobis.org/</a>
ALA	<a href="http://www.ala.org.au/">http://www.ala.org.au/</a>

### Duplicates

See `spocc_duplicates()` for more.

### Clean data

All data cleaning functionality is in a new package: `scrubr` (<https://github.com/ropensci/scrubr>). On CRAN: <https://cran.r-project.org/package=scrubr>. See also package <https://cran.r-project.org/package=CoordinateCleaner>

### Make maps

All mapping functionality is now in a separate package: `mapr`` (<https://github.com/ropensci/mapr>) (formerly `kr` and `cutils`). On CRAN: <https://cran.r-project.org/package=mapr>

### Author(s)

Scott Chamberlain <[myrmecocystus@gmail.com](mailto:myrmecocystus@gmail.com)>

---

as.ala

*Coerce occurrence keys to ALA id objects*

---

### Description

Coerce occurrence keys to ALA id objects

### Usage

```
as.ala(x, ...)
```

**Arguments**

x Various inputs, including the output from a call to `occ()` (class `occdat`), `occ2df()` (class `data.frame`), or a list, numeric, `ala`key, or `oc`key.

... curl options; named parameters passed on to `crul::HttpClient()`

**Value**

One or more in a list of both class `ala`key and `oc`key

**See Also**

Other coercion: [as.bison](#), [as.ecoengine](#), [as.gbif](#), [as.idigbio](#), [as.inat](#), [as.obis](#), [as.vertnet](#)

**Examples**

```
## Not run:
spnames <- c('Barnardius zonarius', 'Grus rubicunda', 'Cracticus tibicen')
out <- occ(query=spnames, from='ala', limit=2)
(res <- occ2df(out))
(tt <- as.ala(out))
as.ala(x = res$key[1])

## End(Not run)
```

---

as.bison

*Coerce occurrence keys to bisonkey/ockey objects*


---

**Description**

Coerce occurrence keys to bisonkey/ockey objects

**Usage**

```
as.bison(x, ...)
```

**Arguments**

x Various inputs, including the output from a call to `occ()` (class `occdat`), `occ2df()` (class `data.frame`), or a list, numeric, character, or bisonkey, or `oc`key.

... curl options; named parameters passed on to `crul::HttpClient()`

**Details**

Internally, we use `rbison::bison_solr()`, same function we use internally within the `occ()` function. Although, we query here with the `occurrenceID` parameter to get the occurrence directly instead of searching for it.

**Value**

One or more in a list of both class bisonkey and occkey

**See Also**

Other coercion: [as.ala](#), [as.ecoengine](#), [as.gbif](#), [as.idigbio](#), [as.inat](#), [as.obis](#), [as.vertnet](#)

**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Setophaga caerulescens',
            'Spinus tristis')
out <- occ(query=spnames, from='bison', limit=2)
res <- occ2df(out)
(tt <- as.bison(out))
(uu <- as.bison(res))
as.bison(as.numeric(res$key[1]))
as.bison(res$key[1])
as.bison(as.list(res$key[1:2]))
as.bison(tt[[1]])
as.bison(uu[[1]])
as.bison(tt[1:2])

## End(Not run)
```

---

as.ecoengine

*Coerce occurrence keys to ecoenginekey/occkey objects*


---

**Description**

Coerce occurrence keys to ecoenginekey/occkey objects

**Usage**

```
as.ecoengine(x, ...)
```

**Arguments**

x                    Various inputs, including the output from a call to [occ\(\)](#) (class occdat), [occ2df\(\)](#) (class data.frame), or a list, numeric, character, or ecoenginekey, or occkey.

...                   curl options; named parameters passed on to [curl::HttpClient\(\)](#)

**Value**

One or more in a list of both class ecoenginekey and occkey

**See Also**

Other coercion: [as.ala](#), [as.bison](#), [as.gbif](#), [as.idigbio](#), [as.inat](#), [as.obis](#), [as.vertnet](#)

**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Spinus tristis')
out <- occ(query=spnames, from='ecoengine', limit=2)
res <- occ2df(out)
(tt <- as.ecoengine(out))
(uu <- as.ecoengine(res))
as.ecoengine(res$key[1])
as.ecoengine(as.list(res$key[1:2]))
as.ecoengine(tt[[1]])
as.ecoengine(uu[[1]])
as.ecoengine(tt[1:2])

## End(Not run)
```

as.gbif

*Coerce occurrence keys to gbifkey/occkey objects***Description**

Coerce occurrence keys to gbifkey/occkey objects

**Usage**

```
as.gbif(x, ...)
```

**Arguments**

x	Various inputs, including the output from a call to <code>occ()</code> (class <code>occdat</code> ), <code>occ2df()</code> (class <code>data.frame</code> ), or a list, numeric, character, gbifkey, or occkey.
...	curl options; named parameters passed on to <code>curl::HttpClient()</code>

**Details**

Internally, we use `rgbif::occ_get()`, whereas `occ()` uses `rgbif::occ_data()`. We can use `rgbif::occ_get()` here because we have the occurrence key to go directly to the occurrence record.

**Value**

One or more in a list of both class gbifkey and occkey

**See Also**

Other coercion: [as.ala](#), [as.bison](#), [as.ecoengine](#), [as.idigbio](#), [as.inat](#), [as.obis](#), [as.vertnet](#)

**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Setophaga caerulescens',
            'Spinus tristis')
out <- occ(query=spnames, from=c('gbif','ebird'),
          gbifopts=list(hasCoordinate=TRUE), limit=2)
res <- occ2df(out)
(tt <- as.gbif(out))
(uu <- as.gbif(res))
as.gbif(as.numeric(res$key[1]))
as.gbif(res$key[1])
as.gbif(as.list(res$key[1:2]))
as.gbif(tt[[1]])
as.gbif(uu[[1]])
as.gbif(tt[1:2])

## End(Not run)
```

as.idigbio

*Coerce occurrence keys to idigbio objects***Description**

Coerce occurrence keys to idigbio objects

**Usage**

```
as.idigbio(x, ...)
```

**Arguments**

**x** Various inputs, including the output from a call to `occ()` (class `occdat`), `occ2df()` (class `data.frame`), or a list, numeric, character, `idigbiokey`, or `occkey`.

**...** curl options; named parameters passed on to `httr::GET()`

**Details**

Internally, we use `idig_view_records`, whereas we use `idig_search_records()` in the `occ()` function.

**Value**

One or more in a list of both class `idigbiokey` and `occkey`

**See Also**

Other coercion: [as.ala](#), [as.bison](#), [as.ecoengine](#), [as.gbif](#), [as.inat](#), [as.obis](#), [as.vertnet](#)

**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Setophaga caerulescens',
  'Spinus tristis')
out <- occ(query=spnames, from='idigbio', limit=2)
res <- occ2df(out)
(tt <- as.idigbio(out))
(uu <- as.idigbio(res))
as.idigbio(res$key[1])
as.idigbio(as.list(res$key[1:2]))
as.idigbio(tt[[1]])
as.idigbio(uu[[1]])
as.idigbio(tt[1:2])

library("dplyr")
bind_rows(lapply(tt, function(x) data.frame(unclass(x)$data)))

## End(Not run)
```

---

as.inat

*Coerce occurrence keys to iNaturalist id objects*


---

**Description**

Coerce occurrence keys to iNaturalist id objects

**Usage**

```
as.inat(x, ...)
```

**Arguments**

**x** Various inputs, including the output from a call to `occ()` (class `occdat`), `occ2df()` (class `data.frame`), or a list, numeric, character, `inatkey`, or `occkey`.

**...** curl options; named parameters passed on to `curl::HttpClient()`

**Value**

One or more in a list of both class `inatkey` and `occkey`

**See Also**

Other coercion: [as.ala](#), [as.bison](#), [as.ecoengine](#), [as.gbif](#), [as.idigbio](#), [as.obis](#), [as.vertnet](#)



**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Setophaga caerulescens',
            'Spinus tristis')
out <- occ(query=spnames, from='inat', limit=2)
res <- occ2df(out)
(tt <- as.inat(out))
(uu <- as.inat(res))
as.inat(res$key[1])
as.inat(as.list(res$key[1:2]))
as.inat(tt[[1]])
as.inat(uu[[1]])
as.inat(tt[1:2])

library("dplyr")
bind_rows(lapply(tt, function(x) {
  data.frame(x$taxon[c('id', 'name', 'rank', 'unique_name')],
            stringsAsFactors = FALSE)
}))

## End(Not run)
```

as.obis

*Coerce occurrence keys to obis id objects***Description**

Coerce occurrence keys to obis id objects

**Usage**

```
as.obis(x, ...)
```

**Arguments**

**x** Various inputs, including the output from a call to `occ()` (class `occdat`), `occ2df()` (class `data.frame`), or a list, numeric, `obiskey`, or `occkey`.

**...** curl options; named parameters passed on to `curl::HttpClient()`

**Value**

One or more in a list of both class `obiskey` and `occkey`

**See Also**

Other coercion: [as.ala](#), [as.bison](#), [as.ecoengine](#), [as.gbif](#), [as.idigbio](#), [as.inat](#), [as.vertnet](#)

**Examples**

```
## Not run:
spnames <- c('Mola mola', 'Loligo vulgaris', 'Stomias boa')
out <- occ(query=spnames, from='obis', limit=2)
(res <- occ2df(out))
(tt <- as.obis(out))
(uu <- as.obis(res))
as.obis(x = res$key[1])
as.obis(as.list(res$key[1:2]))
as.obis(tt[[1]])
as.obis(uu[[1]])
as.obis(tt[1:2])

library("data.table")
rbindlist(tt, use.names = TRUE, fill = TRUE)

## End(Not run)
```

---

as.vertnet

*Coerce occurrence keys to vertnetkey/occkey objects*


---

**Description**

Coerce occurrence keys to vertnetkey/occkey objects

**Usage**

```
as.vertnet(x)
```

**Arguments**

x                    Various inputs, including the output from a call to `occ()` (class `occdat`), `occ2df()` (class `data.frame`), or a list, numeric, character, `vertnetkey`, or `occkey`.

**Details**

Internally, we use `rvertnet::vert_id()`, whereas `occ()` uses `rvertnet::vertsearch()`.

**Value**

One or more in a list of both class `vertnetkey` and `occkey`

**See Also**

Other coercion: [as.ala](#), [as.bison](#), [as.ecoengine](#), [as.gbif](#), [as.idigbio](#), [as.inat](#), [as.obis](#)

**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Setophaga caerulescens',
             'Spinus tristis')
out <- occ(query=spnames, from='vertnet', has_coords=TRUE, limit=2)
res <- occ2df(out)
(tt <- as.vertnet(out))
(uu <- as.vertnet(res))
keys <- Filter(Negate(is.na), res$key)
as.vertnet(keys[1])
as.vertnet(as.list(keys[1:2]))
as.vertnet(tt[[1]])
as.vertnet(uu[[1]])
as.vertnet(tt[1:2])

## End(Not run)
```

bbox2wkt

*Convert a bounding box to a Well Known Text polygon, and a WKT to a bounding box*

**Description**

Convert a bounding box to a Well Known Text polygon, and a WKT to a bounding box

**Usage**

```
bbox2wkt(minx = NA, miny = NA, maxx = NA, maxy = NA, bbox = NULL)
```

```
wkt2bbox(wkt)
```

**Arguments**

minx	Minimum x value, or the most western longitude
miny	Minimum y value, or the most southern latitude
maxx	Maximum x value, or the most eastern longitude
maxy	Maximum y value, or the most northern latitude
bbox	A vector of length 4, with the elements: minx, miny, maxx, maxy
wkt	A Well Known Text object.

**Value**

bbox2wkt returns an object of class `character`, a Well Known Text string of the form `'POLYGON((minx miny, maxx miny, maxx maxy, minx maxy, minx miny))'`

wkt2bbox returns a numeric vector of length 4, like `c(minx, miny, maxx, maxy)`.

**See Also**

Other bbox: [wkt\\_vis](#)

Other bbox: [wkt\\_vis](#)

**Examples**

```
# Convert a bounding box to a WKT

## Pass in a vector of length 4 with all values
bbox2wkt(bbox = c(-125.0,38.4,-121.8,40.9))

## Or pass in each value separately
bbox2wkt(-125.0, 38.4, -121.8, 40.9)

# Convert a WKT object to a bounding box
wkt <- "POLYGON((-125 38.4,-125 40.9,-121.8 40.9,-121.8 38.4,-125 38.4))"
wkt2bbox(wkt)

identical(
  bbox2wkt(-125.0, 38.4, -121.8, 40.9),
  "POLYGON((-125 38.4,-121.8 38.4,-121.8 40.9,-125 40.9,-125 38.4))"
)

identical(
  c(-125.0, 38.4, -121.8, 40.9),
  as.numeric(
    wkt2bbox(
      "POLYGON((-125 38.4,-125 40.9,-121.8 40.9,-121.8 38.4,-125 38.4))"
    )
  )
)
)
```

---

fixnames

*Change names to be the same for each taxon.*

---

**Description**

That is, this function attempts to take all the names that are synonyms, for whatever reason (e.g., some names have authorities on them), and collapses them to the same string - making data easier to deal with for making maps, etc.

**Usage**

```
fixnames(obj, how = "shortest", namevec = NULL)
```

**Arguments**

obj	An object of class occdat
how	One of a few different methods: <ul style="list-style-type: none"> <li>• shortest Takes the shortest name string that is likely to be the prettiest to display name, and replaces all names with that one, better for maps, etc.</li> <li>• query This method takes the names you originally queried on (in the occdat object), and replaces names in the occurrence data with them.</li> <li>• supplied If this method, supply a vector of names to replace the names with</li> </ul>
namevec	A vector of names to replace names in the occurrence data.frames with. Only used if how="supplied"

**Value**

An object of class occdat.

**Examples**

```
## Not run:
spp <- c('Danaus plexippus', 'Accipiter striatus', 'Pinus contorta')
dat <- occ(spp, from='gbif', gbifopts=list(hasCoordinate=TRUE), limit=50)
fixnames(dat, how="shortest")$gbif
fixnames(dat, how="query")$gbif
fixnames(dat, how="supplied", namevec = c('abc', 'def', 'ghi'))$gbif

dat <- occ(spp, from='ecoengine', limit=50)
## doesn't changes things
fixnames(dat, how="shortest")$ecoengine$data$Danaus_plexippus
## this is better
fixnames(dat, how="query")$ecoengine$data$Danaus_plexippus
## or this
fixnames(dat, how="supplied",
  namevec = c("Danaus", "Accipiter", "Pinus"))$ecoengine$data$Danaus_plexippus

## End(Not run)
```

---

inspect

*Get more data on individual occurrences*


---

**Description**

Fetches the complete record, which may or may not be the same as requested through `occ()`. Some data providers have different ways to retrieve many occurrence records vs. single occurrence records - and sometimes the results are more verbose when retrieving a single occurrence record.

**Usage**

```
inspect(x, from = "gbif")

## S3 method for class 'data.frame'
inspect(x, from = "gbif")

## S3 method for class 'occdat'
inspect(x, from = "gbif")

## S3 method for class 'occkey'
inspect(x, from = "gbif")
```

**Arguments**

x	The output from <code>occ()</code> call, output from call to <code>occ2df()</code> , or an occurrence ID as a <code>occkey</code> class.
from	(character) The data provider. One of <code>gbif</code> , <code>bison</code> , <code>inat</code> , <code>ecoengine</code> , or <code>vertnet</code>

**Value**

A list, with each slot named for the data source, and then within data sources is a slot for each taxon, named by its occurrence ID.

**Examples**

```
## Not run:
spnames <- c('Accipiter striatus', 'Spinus tristis')
out <- occ(query=spnames, from=c('gbif', 'bison', 'ecoengine'),
  gbifopts=list(hasCoordinate=TRUE), limit=2)
res <- occ2df(out)
inspect(res)

out <- occ(query=spnames, from='gbif', gbifopts=list(hasCoordinate=TRUE),
  limit=4)
res <- occ2df(out)
inspect(res)

# from occkey
key <- as.gbif(res$key[1])
inspect(key)

# idigbio
spnames <- c('Accipiter striatus', 'Spinus tristis')
out <- occ(query=spnames, from='idigbio', limit=20)
inspect(out)

## End(Not run)
```

---

 occ

---

*Search for species occurrence data across many data sources.*


---

## Description

Search on a single species name, or many. And search across a single or many data sources.

## Usage

```
occ(query = NULL, from = "gbif", limit = 500, start = NULL,
    page = NULL, geometry = NULL, has_coords = NULL, ids = NULL,
    date = NULL, callopts = list(), gbifopts = list(),
    bisonopts = list(), inatopts = list(), ebirdopts = list(),
    ecoengineopts = list(), vertnetopts = list(), idigbioopts = list(),
    obisopts = list(), alaopts = list(), throw_warnings = TRUE)
```

## Arguments

query	(character) One to many scientific names. See Details for what parameter in each data source we query. Note: ebird now expects species codes instead of scientific names - we pass you name through <code>rebird::species_code()</code> internally
from	(character) Data source to get data from, any combination of gbif, bison, inat, ebird, ecoengine and/or vertnet
limit	(numeric) Number of records to return. This is passed across all sources. To specify different limits for each source, use the options for each source (gbifopts, bisonopts, inatopts, ebirdopts, and ecoengineopts). See Details for more. Default: 500 for each source. BEWARE: if you have a lot of species to query for (e.g., n = 10), that's 10 * 500 = 5000, which can take a while to collect. So, when you first query, set the limit to something smallish so that you can get a result quickly, then do more as needed.
start, page	(integer) Record to start at or page to start at. See Paging in Details for how these parameters are used internally. Optional
geometry	(character or numeric) One of a Well Known Text (WKT) object or a vector of length 4 specifying a bounding box. This parameter searches for occurrences inside a box given as a bounding box or polygon described in WKT format. A WKT shape written as POLYGON((30.1 10.1, 20 40, 40 40, 30.1 10.1)) would be queried as is, i.e. <a href="http://bit.ly/HwUSif">http://bit.ly/HwUSif</a> . See Details for more examples of WKT objects. The format of a bounding box is min-longitude, min-latitude, max-longitude, max-latitude. Geometry is not possible with vertnet right now, but should be soon. See Details for more info on geometry inputs.
has_coords	(logical) Only return occurrences that have lat/long data. This works for gbif, ecoengine, rinat, idigbio, and vertnet, but is ignored for ebird and bison data sources. You can easily though remove records without lat/long data.

ids	Taxonomic identifiers. This can be a list of length 1 to many. See examples for usage. Currently, identifiers for only 'gbif' and 'bison' for parameter 'from' supported. If this parameter is used, query parameter can not be used - if it is, a warning is thrown.
date	(character/Date) A length 2 vector containing two dates of the form YYYY-MM-DD. These can be character of Date class. These are used to do a date range search. Of course there are other types of date searches one may want to do but date range seems like the most common date search use case.
callopts	Options passed on to <code>curl::HttpClient</code> , e.g., for debugging curl calls, setting timeouts, etc. This parameter is ignored for sources: inat.
gbifopts	(list) List of named options to pass on to <code>rgbif::occ_search()</code> . See also <code>occ_options()</code>
bisonopts	(list) List of named options to pass on to <code>rbison::bison()</code> . See also <code>occ_options()</code>
inatopts	(list) List of named options to pass on to internal function <code>get_inat_obs</code>
ebirdopts	(list) List of named options to pass on to <code>rebird::ebirdregion()</code> or <code>rebird::ebirdgeo()</code> . See also <code>occ_options()</code>
ecoengineopts	(list) List of named options to pass on to <code>ee_observations</code> . See also <code>occ_options()</code> .
vertnetopts	(list) List of named options to pass on to <code>rvertnet::searchbyterm()</code> . See also <code>occ_options()</code> .
ridigbioopts	(list) List of named options to pass on to <code>ridigbio::idig_search_records()</code> . See also <code>occ_options()</code> .
obisopts	(list) List of named options to pass on to internal function. See <a href="https://github.com/iobis/api-docs">https://github.com/iobis/api-docs</a> for possible parameters
alaopts	(list) List of named options to pass on to internal function. See Occurrence search part of the API docs at <a href="http://api.ala.org.au/#ws3">http://api.ala.org.au/#ws3</a> for possible parameters.
throw_warnings	(logical) <code>occ()</code> collects errors returned from each data provider when they occur, and are accessible in the <code>\$meta\$errors</code> slot for each data provider. If you set <code>throw_warnings=TRUE</code> , we give these request errors as warnings with <code>warning()</code> . if <code>FALSE</code> , we don't give warnings, but you can still access them in the output.

## Details

The `occ` function is an opinionated wrapper around the `rgbif`, `rbison`, `rinat`, `rebird`, `ecoengine`, `rvertnet` and `ridigbio` packages (as well as internal custom wrappers around some data sources) to allow data access from a single access point. We take care of making sure you get useful objects out at the cost of flexibility/options - although you can still set options for each of the packages via the `gbifopts`, `bisonopts`, `inatopts`, etc. parameters.

## Value

an object of class `occdat`, with a `print` method to give a brief summary. The `print` method only shows results for those that have some results (those with no results are not shown). The `occdat` class is just a thin wrapper around a named list, wher the top level names are the data sources:

- `gbif`



- bison
- inat
- ebird
- ecoengine
- vertnet
- idigbio
- obis
- ala

Note that you only get data back for sources that were specified in the `from` parameter. All others are present, but empty.

Then within each data source is an object of class `occdatind` holding another named list that contains:

- `meta`: metadata
  - `source`: the data source name (e.g., "gbif")
  - `time`: time the request was sent
  - `found`: number of records found (number found across all queries)
  - `returned`: number of records returned (number of rows in all `data.frame`'s in the data slot)
  - `type`: query type, only "sci" for scientific
  - `opts`: a named list with the options you sent to the data source
  - `errors`: a character vector of errors returned, if any occurred
- `data`: named list of `data.frame`'s, named by the queries sent

## Inputs

All inputs to `occ` are one of:

- scientific name
- taxonomic id
- geometry as bounds, WKT, or Spatial classes

To search by common name, first use `occ_names()` to find scientific names or taxonomic IDs, then feed those to this function. Or use the `taxize` package to get names and/or IDs to use here.

## Using the query parameter

When you use the `query` parameter, we pass your search terms on to parameters within functions that query data sources you specify. Those parameters are:

- `rgbif` - `scientificName` in the `rgbif::occ_search()` function - API parameter: same as the `occ` parameter
- `rebird` - `species` in the `rebird::ebirdregion()` or `rebird::ebirdgeo()` functions, depending on whether you set `method="ebirdregion"` or `method="ebirdgeo"` - API parameters: `sci` for both `rebird::ebirdregion()` and `rebird::ebirdgeo()`

- ecoengine - scientific\_name in the ee\_observations function - API parameter: same as occ parameter
- rbison - species or scientificName in the `rbison::bison()` or `rbison::bison_solr()` functions, respectively. If you don't pass anything to geometry parameter we use `bison_solr`, and if you do we use `bison` - API parameters: same as occ parameters
- rvertnet - taxon in the `rvertnet::vertsearch()` function - API parameter: q
- ridigbio - scientificname in the `ridigbio::idig_search_records()` function - API parameter: scientificname
- inat - internal function - API parameter: q
- obis - internal function - API parameter: scientificName
- ala - internal function - API parameter: q

If you have questions about how each of those parameters behaves with respect to the terms you pass to it, lookup documentation for those functions, or get in touch at the development repository <https://github.com/ropensci/spocc/issues>

### iDigBio notes

When searching iDigBio note that by default we set `fields = "all"`, so that we return a richer suite of fields than the `ridigbio` R client gives by default. But you can change this by passing in a `fields` parameter to `idigbioopts` parameter with the specific fields you want.

Maximum of 100,000 results are allowed to be returned. See <https://github.com/iDigBio/ridigbio/issues/33>

### Ecoengine notes

When searching ecoengine, you can leave the `page` argument blank to get a single page. Otherwise use `page` ranges or simply "all" to request all available pages. Note however that this may hang your call if the request is simply too large.

### BISON notes

We use two different functions when you request data from bison. We use `rbison::bison_solr()` by default as it's more flexible. If you pass a value to the `geometry` parameter we use `rbison::bison()`. We'd prefer to just use one function to simplify things, but `rbison::bison_solr()` doesn't support geometry queries.

### limit parameter

The `limit` parameter is set to a default of 25. This means that you will get **up to** 25 results back for each data source you ask for data from. If there are no results for a particular source, you'll get zero back; if there are 8 results for a particular source, you'll get 8 back. If there are 26 results for a particular source, you'll get 25 back. You can always ask for more or less back by setting the `limit` parameter to any number. If you want to request a different number for each source, pass the appropriate parameter to each data source via the respective `options` parameter for each data source.

## WKT

WKT objects are strings of pairs of lat/long coordinates that define a shape. Many classes of shapes are supported, including POLYGON, POINT, and MULTIPOLYGON. Within each defined shape define all vertices of the shape with a coordinate like 30.1 10.1, the first of which is the latitude, the second the longitude.

Examples of valid WKT objects:

- 'POLYGON((30.1 10.1, 10 20, 20 60, 60 60, 30.1 10.1))'
- 'POINT((30.1 10.1))'
- 'LINESTRING(3 4,10 50,20 25)'
- 'MULTIPOINT((3.5 5.6),(4.8 10.5))'
- 'MULTILINESTRING((3 4,10 50,20 25),(-5 -8,-10 -8,-15 -4))'
- 'MULTIPOLYGON(((1 1,5 5,1 5,1 1),(2 2,2 3,3 3,2 2)),((6 3,9 2,9 4,6 3)))'
- 'GEOMETRYCOLLECTION(POINT(4 6),LINESTRING(4 6,7 10))'

Only POLYGON objects are currently supported.

Getting WKT polygons or bounding boxes. We will soon introduce a function to help you select a bounding box but for now, you can use a few sites on the web.

- Bounding box - <http://boundingbox.klokantech.com/>
- Well known text - <http://arthur-e.github.io/Wicket/sandbox-gmaps3.html>

## geometry parameter

The behavior of the occ function with respect to the geometry parameter varies depending on the inputs to the query parameter. Here are the options:

- geometry (single), no query - If a single bounding box/WKT string passed in, and no query, a single query is made against each data source.
- geometry (many), no query - If many bounding boxes/WKT strings are passed in, we do a separate query for each bounding box/WKT string against each data source.
- geometry (single), query - If a single bounding box/WKT string passed in, and a single query, we do a single query against each data source.
- geometry (many), query - If many bounding boxes/WKT strings are passed in, and a single query, we do a separate query for each bounding box/WKT string with the same queried name against each data source.
- geometry (single), many query - If a single bounding box/WKT string passed in, and many names to query, we do a separate query for each name, using the same geometry, for each data source.
- geometry (many), many query - If many bounding boxes/WKT strings are passed in, and many names to query, this poses a problem for all data sources, none of which accept many bounding boxes of WKT strings. So, in this scenario, we loop over each name and each geometry query, and then re-combine by queried name, so that you get back a single group of data for each name.

## Geometry options by data provider

### wkt & bbox allowed, see WKT section above

- gbif
- bison
- obis
- ala

### bbox only

- ecoengine
- inat
- idigbio

### No spatial search allowed

- ebird
- vertnet

## Notes on the date parameter

Date searches with the date parameter are allowed for all sources except ebird.

Notes on some special cases

- idigbio: We search on the datecollected field. Other date fields can be searched on, but we chose datecollected as it seemed most appropriate.
- vertnet: If you want more flexible date searches, you can pass various types of date searches to vertnetopts. See [rvtnet::searchbyterm\(\)](#) for more information
- ala: There's some issues with the dates returned from ALA. They are returned as time stamps, and some seem to be malformed. So do beware of using ALA dates for important things.

Get in touch if you have other date search use cases you think are widely useful

## Paging

All data sources respond to the `limit` parameter passed to `occ`.

Data sources, however, vary as to whether they respond to an offset. Here's the details on which data sources will respond to `start` and which to the `page` parameter:

- gbif - Responds to `start`. Default: 0
- ecoengine - Responds to `page`. Default: 1
- bison - Responds to `start`. Default: 0
- inat - Responds to `page`. Default: 1
- ebird - No paging, both `start` and `page` ignored.

- `vertnet` - No paging implemented here, both `start` and `page` ignored. VertNet does have a form of paging, but it uses a cursor, and can't easily be included here via parameters. However, `rvertnet` does paging internally for you. For example, the max records per request for VertNet is 1000; if you request 2000 records, we'll do the first request, and do the second request for you automatically.
- `idigbio` - Responds to `start`. Default: 0
- `obis` - Responds to `start`. Default: 0
- `ala` - Responds to `start`. Default: 0

## BEWARE

In cases where you request data from multiple providers, especially when including GBIF, there could be duplicate records since many providers' data eventually ends up with GBIF. See [spocc\\_duplicates\(\)](#) for more.

## See Also

Other queries: [occ\\_names\\_options](#), [occ\\_names](#), [occ\\_options](#), [spocc\\_objects](#)

## Examples

```
## Not run:
# Single data sources
(res <- occ(query = 'Accipiter striatus', from = 'gbif', limit = 5))
res$gbif
(res <- occ(query = 'Accipiter', from = 'ecoengine', limit = 50))
res$ecoengine
(res <- occ(query = 'Accipiter striatus', from = 'ebird', limit = 50))
res$ebird
(res <- occ(query = 'Danaus plexippus', from = 'inat', limit = 50))
res$inat
(res <- occ(query = 'Bison bison', from = 'bison', limit = 50))
res$bison
(res <- occ(query = 'Bison bison', from = 'vertnet', limit = 5))
res$vertnet
res$vertnet$data$Bison_bison
occ2df(res)

# Paging
one <- occ(query = 'Accipiter striatus', from = 'gbif', limit = 5)
two <- occ(query = 'Accipiter striatus', from = 'gbif', limit = 5, start = 5)
one$gbif
two$gbif

# Date range searches across data sources
## Not possible for ebird
## bison
occ(query = 'Acer', date = c('2010-08-08', '2010-08-21'), from = 'bison', limit=5)
## ala
occ(date = c('2018-01-01T00:00:00Z', '2018-03-28T00:00:00Z'), from = 'ala', limit = 5)
```

```

## gbif
occ(query = 'Accipiter striatus', date = c('2010-08-01', '2010-08-31'), from = 'gbif', limit=5)
# ecoengine
occ(date = c('2010-01-01', '2010-12-31'), from = 'ecoengine', limit=5)
## vertnet
occ(query = 'Mustela nigripes', date = c('1990-01-01', '2015-12-31'), from = 'vertnet', limit=5)
## idigbio
occ(query = 'Acer', date = c('2010-01-01', '2015-12-31'), from = 'idigbio', limit=5)
## obis
occ(query = 'Mola mola', date = c('2015-01-01', '2015-12-31'), from = 'obis', limit=5)
## inat
occ(query = 'Danaus plexippus', date = c('2015-01-01', '2015-12-31'), from = 'inat', limit=5)

# Restrict to records with coordinates
occ(query = "Acer", from = "idigbio", limit = 5, has_coords = TRUE)

occ(query = 'Setophaga caerulescens', from = 'ebird', ebirdopts = list(loc='US'))
occ(query = 'Spinus tristis', from = 'ebird', ebirdopts =
  list(method = 'ebirdgeo', lat = 42, lng = -76, dist = 50))

# idigbio data
## scientific name search
occ(query = "Acer", from = "idigbio", limit = 5)
occ(query = "Acer", from = "idigbio", idigbioopts = list(offset = 5, limit = 3))
## geo search
bounds <- c(-120, 40, -100, 45)
occ(from = "idigbio", geometry = bounds, limit = 10)
## just class arachnida, spiders
occ(idigbioopts = list(rq = list(class = 'arachnida')), from = "idigbio", limit = 10)
## search certain recordsets
sets <- c("1ffc054-8e3e-4209-9ff4-c26fa6c24c2f",
          "8dc14464-57b3-423e-8cb0-950ab8f36b6f",
          "26f7cbde-fbcb-4500-80a9-a99daa0ead9d")
occ(idigbioopts = list(rq = list(recordset = sets)), from = "idigbio", limit = 10)

# You can pass on limit param to all sources even though its a different param in that source
## ecoengine example
res <- occ(query = 'Accipiter striatus', from = 'ecoengine', ecoengineopts=list(limit = 5))
res$ecoengine
## This is particularly useful when you want to set different limit for each source
(res <- occ(query = 'Accipiter striatus', from = c('gbif','ecoengine'),
  gbifopts=list(limit = 10), ecoengineopts=list(limit = 5)))

# Many data sources
(out <- occ(query = 'Pinus contorta', from=c('gbif','bison','vertnet'), limit=10))

## Select individual elements
out$gbif
out$gbif$data
out$vertnet

## Coerce to combined data.frame, selects minimal set of

```

```

## columns (name, lat, long, provider, date, occurrence key)
occ2df(out)

# Pass in limit parameter to all sources. This limits the number of occurrences
# returned to 10, in this example, for all sources, in this case gbif and inat.
occ(query='Pinus contorta', from=c('gbif','inat'), limit=10)

# Geometry
## Pass in geometry parameter to all sources. This constraints the search to the
## specified polygon for all sources, gbif and bison in this example.
## Check out http://arthur-e.github.io/Wicket/sandbox-gmaps3.html to get a WKT string
occ(query='Accipiter', from='gbif',
     geometry='POLYGON((30.1 10.1, 10 20, 20 60, 60 60, 30.1 10.1))')
occ(query='Helianthus annuus', from='bison', limit=50,
     geometry='POLYGON((-111.06 38.84, -110.80 39.37, -110.20 39.17, -110.20 38.90,
                       -110.63 38.67, -111.06 38.84))')

## Or pass in a bounding box, which is automatically converted to WKT (required by GBIF)
## via the bbox2wkt function. The format of a bounding box is
## [min-longitude, min-latitude, max-longitude, max-latitude].
occ(query='Accipiter striatus', from='gbif', geometry=c(-125.0,38.4,-121.8,40.9))

## Bounding box constraint with ecoengine
## Use this website: http://boundingbox.klokantech.com/ to quickly grab a bbox.
## Just set the format on the bottom left to CSV.
occ(query='Accipiter striatus', from='ecoengine', limit=10,
     geometry=c(-125.0,38.4,-121.8,40.9))

## lots of results, can see how many by indexing to meta
res <- occ(query='Accipiter striatus', from='gbif',
           geometry='POLYGON((-69.9 49.2,-69.9 29.0,-123.3 29.0,-123.3 49.2,-69.9 49.2))')
res$gbif

## You can pass in geometry to each source separately via their opts parameter, at
## least those that support it. Note that if you use rinat, you reverse the order, with
## latitude first, and longitude second, but here it's the reverse for consistency across
## the spocc package
bounds <- c(-125.0,38.4,-121.8,40.9)
occ(query = 'Danaus plexippus', from="inat", geometry=bounds)

## Passing geometry with multiple sources
occ(query = 'Danaus plexippus', from=c("inat","gbif","ecoengine"), geometry=bounds)

## Using geometry only for the query
### A single bounding box
occ(geometry = bounds, from = "gbif", limit=50)
### Many bounding boxes
occ(geometry = list(c(-125.0,38.4,-121.8,40.9), c(-115.0,22.4,-111.8,30.9)), from = "gbif")

## Many geometry and many names
res <- occ(query = c('Danaus plexippus', 'Accipiter striatus'),
           geometry = list(c(-125.0,38.4,-121.8,40.9), c(-115.0,22.4,-111.8,30.9)), from = "bison")
res

```

```

## Geometry only with WKT
wkt <- 'POLYGON((-98.9 44.2,-89.1 36.6,-116.7 37.5,-102.5 39.6,-98.9 44.2))'
occ(from = "gbif", geometry = wkt, limit = 10)

# Specify many data sources, another example
ebirdopts = list(loc = 'US'); gbifopts = list(country = 'US')
out <- occ(query = 'Setophaga caerulescens', from = c('gbif','inat','bison','ebird'),
  gbifopts = gbifopts, ebirdopts = ebirdopts, limit=20)
occ2df(out)

# Pass in many species names, combine just data to a single data.frame, and
# first six rows
spnames <- c('Accipiter striatus', 'Setophaga caerulescens', 'Spinus tristis')
(out <- occ(query = spnames, from = 'gbif', gbifopts = list(hasCoordinate = TRUE), limit=25))
df <- occ2df(out)
head(df)

# no query, geometry, or ids passed
## many dataset keys to gbif
dsets <- c("14f3151a-e95d-493c-a40d-d9938ef62954", "f934f8e2-32ca-46a7-b2f8-b032a4740454")
occ(limit = 20, from = "gbif", gbifopts = list(datasetKey = dsets))
## class name to idigbio
occ(limit = 20, from = "idigbio", idigbioopts = list(rq = list(class = 'arachnida'))))
## limit to ecoengine
occ(from = "ecoengine", ecoengineopts = list(limit = 3))

# taxize integration
## You can pass in taxonomic identifiers
library("taxize")
(ids <- get_ids(names=c("Chironomus riparius","Pinus contorta"), db = c('itis','gbif'))))
occ(ids = ids[[1]], from='bison', limit=20)
occ(ids = ids, from=c('bison','gbif'), limit=20)

(ids <- get_ids(names="Chironomus riparius", db = 'gbif'))
occ(ids = ids, from='gbif', limit=20)

(ids <- get_gbifid("Chironomus riparius"))
occ(ids = ids, from='gbif', limit=20)

(ids <- get_tsn('Accipiter striatus'))
occ(ids = ids, from='bison', limit=20)

# SpatialPolygons/SpatialPolygonsDataFrame integration
library("sp")
## Single polygon in SpatialPolygons class
one <- Polygon(cbind(c(91,90,90,91), c(30,30,32,30)))
spone = Polygons(list(one), "s1")
sppoly = SpatialPolygons(list(spone), as.integer(1))
out <- occ(geometry = sppoly, limit=50)
out$gbif$data

## Two polygons in SpatialPolygons class

```



```

one <- Polygon(cbind(c(-121.0,-117.9,-121.0,-121.0), c(39.4, 37.1, 35.1, 39.4)))
two <- Polygon(cbind(c(-123.0,-121.2,-122.3,-124.5,-123.5,-124.1,-123.0),
                    c(44.8,42.9,41.9,42.6,43.3,44.3,44.8)))
spone = Polygons(list(one), "s1")
sptwo = Polygons(list(two), "s2")
sppoly = SpatialPolygons(list(spone, sptwo), 1:2)
out <- occ(geometry = sppoly, limit=50)
out$gbif$data

## Two polygons in SpatialPolygonsDataFrame class
sppoly_df <- SpatialPolygonsDataFrame(sppoly,
  data.frame(a=c(1,2), b=c("a","b"), c=c(TRUE,FALSE),
    row.names=row.names(sppoly)))
out <- occ(geometry = sppoly_df, limit=50)
out$gbif$data

# curl debugging
library('httr')
occ(query = 'Accipiter striatus', from = 'gbif', limit=10,
  callopts=list(verbose = TRUE))
occ(query = 'Accipiter striatus', from = 'bison', limit=10,
  callopts=list(verbose = TRUE))
occ(query = 'Accipiter striatus', from = 'ecoengine', limit=10,
  callopts=list(verbose = TRUE))
occ(query = 'Accipiter striatus', from = 'inat',
  callopts=list(verbose = TRUE))
occ(query = 'Mola mola', from = 'obis', limit = 200,
  callopts = list(verbose = TRUE))

##### More thorough data source specific examples
# idigbio
## scientific name search
res <- occ(query = "Acer", from = "idigbio", limit = 5)
res$idigbio

## geo search
### bounding box
bounds <- c(-120, 40, -100, 45)
occ(from = "idigbio", geometry = bounds, limit = 10)
### wkt
# wkt <- 'POLYGON((-69.9 49.2,-69.9 29.0,-123.3 29.0,-123.3 49.2,-69.9 49.2))'
wkt <- 'POLYGON((-98.9 44.2,-89.1 36.6,-116.7 37.5,-102.5 39.6,-98.9 44.2))'
occ(from = "idigbio", geometry = wkt, limit = 10)

## limit fields returned
occ(query = "Acer", from = "idigbio", limit = 5,
  idigbioopts = list(fields = "scientificname"))

## offset and max_items
occ(query = "Acer", from = "idigbio", limit = 5,
  idigbioopts = list(offset = 10))

## sort

```

```

occ(query = "Acer", from = "idigbio", limit = 5,
     idigbioopts = list(sort = TRUE))$idigbio
occ(query = "Acer", from = "idigbio", limit = 5,
     idigbioopts = list(sort = FALSE))$idigbio

## more complex queries
### parameters passed to "rq", get combined with the name queried
occ(query = "Acer", from = "idigbio", limit = 5,
     idigbioopts = list(rq = list(basisofrecord="fossilspecimen")))$idigbio

#### NOTE: no support for multipolygons yet
## WKT's are more flexible than bounding box's. You can pass in a WKT with multiple
## polygons like so (you can use POLYGON or MULTIPOLYGON) when specifying more than one
## polygon. Note how each polygon is in it's own set of parentheses.
# occ(query='Accipiter striatus', from='gbif',
#      geometry='MULTIPOLYGON((30 10, 10 20, 20 60, 60 60, 30 10),
#                               (30 10, 10 20, 20 60, 60 60, 30 10))')

# OBIS examples
## basic query
(res <- occ(query = 'Mola mola', from = 'obis', limit = 200))
## get to obis data
res$obis
## get obis + gbif data
(res <- occ(query = 'Mola mola', from = c('obis', 'gbif'), limit = 200))
res$gbif
res$obis
## no match found
(res <- occ(query = 'Linguimaera thomsonia', from = 'obis'))
## geometry query
geometry <- "POLYGON((8.98 48.05,15.66 48.05,15.66 45.40,8.98 45.40,8.98 48.05))"
(res <- occ(from = 'obis', geometry = geometry, limit = 50))
res$obis
## Pass in spatial classes
library("sp")
one <- Polygon(cbind(c(45,30,30,45), c(35,35,30,30)))
spone = Polygons(list(one), "s1")
sppoly = SpatialPolygons(list(spone), as.integer(1))
(res <- occ(from = 'obis', geometry = sppoly, limit = 50))
## Do paging
(res1 <- occ(query = 'Mola mola', from = 'obis', limit = 10))
(res2 <- occ(query = 'Mola mola', from = 'obis', limit = 10, start = 20))
res1$obis
res2$obis
## Pass in any occurrence route parameters to obisopts as a list
(res <- occ(query = 'Mola mola', from = 'obis',
            obisopts = list(year = 2005)))
unique(res$obis$data$Mola_mola$yearcollected)

# ALA examples
## basic query
(res <- occ(query = 'Alaba vibex', from = 'ala', limit = 200))

```

```
## get to ala data
res$ala
occ2df(res)

# geometry search
(x <- occ(query = "Macropus", from = 'ala',
  geometry = "POLYGON((145 -37,150 -37,150 -30,145 -30,145 -37))"))
x$ala
occ2df(x)

## End(Not run)
```

---

occ2df

*Combine results from occ calls to a single data.frame*

---

## Description

Combine results from occ calls to a single data.frame

## Usage

```
occ2df(obj, what = "data")
```

## Arguments

obj	Input from occ, an object of class occdat, or an object of class occdatind, the individual objects from each source within the occdat class.
what	(character) One of data (default) or all (with metadata)

## Details

This function combines a subset of data from each data provider to a single data.frame, or metadata plus data if you request what="all". The single data.frame contains the following columns:

- name - scientific (or common) name
- longitude - decimal degree longitude
- latitude - decimal degree latitude
- prov - data provider
- date - occurrence record date
- key - occurrence record key

## Examples

```
## Not run:
# combine results from output of an occ() call
spnames <- c('Accipiter striatus', 'Setophaga caerulescens',
            'Spinus tristis')
out <- occ(query=spnames, from='gbif', gbifopts=list(hasCoordinate=TRUE),
          limit=10)
occ2df(out)
occ2df(out$gbif)

out <- occ(
  query='Accipiter striatus',
  from=c('gbif','bison','ecoengine','ebird','inat','vertnet'),
  gbifopts=list(hasCoordinate=TRUE), limit=2)
occ2df(out)
occ2df(out$vertnet)

# or combine many results from a single data source
spnames <- c('Accipiter striatus', 'Spinus tristis')
out <- occ(query=spnames, from='ecoengine', limit=2)
occ2df(out$ecoengine)

spnames <- c('Accipiter striatus', 'Spinus tristis')
out <- occ(query=spnames, from='gbif', limit=2)
occ2df(out$gbif)

## End(Not run)
```

---

occ\_names

*Search for species names across many data sources.*

---

## Description

Search for species names across many data sources.

## Usage

```
occ_names(query = NULL, from = "gbif", limit = 100,
          rank = "species", callopts = list(), gbifopts = list(),
          bisonopts = list(), ecoengineopts = list())
```

## Arguments

query	(character) One to many names. Either a scientific name or a common name. Only scientific names supported right now.
from	(character) Data source to get data from, any combination of gbif, bison, or ecoengine.

limit	(numeric) Number of records to return. This is passed across all sources. To specify different limits for each source, use the options for each source (gbifopts, bisonopts, ecoengineopts). See Details for more. This parameter is ignored for ecoengine.
rank	(character) Taxonomic rank to limit search space. Used in GBIF, but not used in BISON.
callopts	Options passed on to <code>crul::HttpClient()</code> , e.g., for debugging curl calls, setting timeouts, etc.
gbifopts	(list) List of named options to pass on to <code>rgbif::name_lookup()</code> . See also <code>spocc::occ_names_options()</code>
bisonopts	(list) List of named options to pass on to <code>rbison::bison_tax()</code> . See also <code>spocc::occ_names_options()</code>
ecoengineopts	(list) List of named options to pass on to <code>ee_search</code> . See also <code>spocc::occ_names_options()</code>

### Details

Not all 7 data sources available from the `occ()` function are available here, as not all of those sources have functionality to search for names.

We strongly encourage you to use the `taxize` package if you want to search for taxonomic or common names, convert common to scientific names, etc. That package was built exactly for that purpose, and we only provide a bit of name searching here in this function.

### See Also

Other queries: [occ\\_names\\_options](#), [occ\\_options](#), [occ](#), [spocc\\_objects](#)

### Examples

```
## Not run:
# Single data sources
## gbif
(res <- occ_names(query = 'Accipiter striatus', from = 'gbif'))
head(res$gbif$data[[1]])

## bison
(res <- occ_names(query = '*bear', from = 'bison'))
res$bison$data

## ecoengine
(res <- occ_names(query = 'genus:Lynx', from = 'ecoengine'))
head(res$ecoengine$data[[1]])

## End(Not run)
```

---

occ_names_options	<i>Look up options for parameters passed to each source for occ_names function</i>
-------------------	--

---

### Description

Look up options for parameters passed to each source for occ\_names function

### Usage

```
occ_names_options(from = "gbif", where = "console")
```

### Arguments

from	(character) Data source to get data from, any combination of gbif or bison. Case doesn't matter.
where	(character) One of console (print to console) or html (opens help page, if in non-interactive R session, prints help to console).

### Details

Any of the parameters passed to e.g. `rgbif::name_lookup()` from the `rgbif` package can be passed in the associated `gbifopts` list in `occ()`.

Note that the `from` parameter is lowercased within the function and is called through `match.arg` first, so you can match on unique partial strings too (e.g., `'rb'` for `'rbison'`).

For `ecoengine`, we use internal helper functions and don't import the package, but see `?ecoengine::ee_search` for help on parameters.

### Value

Opens up the documentation for the function that is used internally within the `occ` function for each source.

### See Also

Other queries: [occ\\_names](#), [occ\\_options](#), [occ](#), [spocc\\_objects](#)

### Examples

```
## Not run:
# opens up documentation for this function
occ_names_options()

# Open up documentation for the appropriate search function for each source
occ_names_options('gbif')
occ_names_options('bison')

# Or open in html version
```

```
occ_names_options('bison', 'html')

## End(Not run)
```

---

occ\_options                      *Look up options for parameters passed to each source*

---

## Description

Look up options for parameters passed to each source

## Usage

```
occ_options(from = "gbif", where = "console")
```

## Arguments

from	(character) Data source to get data from, any combination of gbif, bison, ebird, idigibio and/or vertnet. Case doesn't matter. inat is not included here, see that package's help docs.
where	(character) One of console (print to console) or html (opens help page, if in non-interactive R session, prints help to console).

## Details

Any of the parameters passed to e.g. `rgbif::occ_data()` from the `rgbif` package can be passed in the associated `gbifopts` list in `occ()`

Note that the `from` parameter is lowercased within the function and is called through `match.arg` first, so you can match on unique partial strings too (e.g., `'rv'` for `'rvertnet'`).

For some data sources we don't import the canonical package, but instead have our own internal helper functions and the package in question is not imported, but we do suggest seeing the help for the package on their parameters:

- **ecoengine**: `?ecoengine::ee_observations`

## Value

Opens up the documentation for the function that is used internally within the `occ` function for each source.

## See Also

Other queries: [occ\\_names\\_options](#), [occ\\_names](#), [occ](#), [spocc\\_objects](#)

## Examples

```
## Not run:
# opens up documentation for this function
occ_options()

# Open up documentation for the appropriate search function for each source
occ_options('gbif')
occ_options('ebird')
occ_options('bison')
occ_options('idigbio')
occ_options('vertnet')

# Or open in html version
occ_options('bison', 'html')

## End(Not run)
```

---

spocc\_duplicates      *A note about duplicate occurrence records*

---

## Description

BEWARE: spocc provides you a nice interface to many data providers for species occurrence data. However, in cases where you request data from GBIF *in addition* to other data sources, there could be duplicate records. This is because GBIF is, to use an ecology analogy, a top predator, and pulls in data from lower nodes in the food chain. For example, iNaturalist provides data to GBIF, so if you search for occurrence records for *Pinus contorta* from iNaturalist and GBIF, you could get, for example, 20 of the same records.

We think a single R interface to many occurrence record providers will provide a consistent way to work with occurrence data, making analyses and visualizations more repeatable across providers.

For cleaning data, see packages `scrubr` (<https://cran.r-project.org/package=scrubr>) and `CoordinateCleaner` (<https://cran.r-project.org/package=CoordinateCleaner>)

Do get in touch with us if you have concerns, have ideas for eliminating duplicates

---

wkt\_vis      *Visualize well-known text area's on a map.*

---

## Description

This can be helpful in visualizing the area in which you are searching for occurrences with the `occ()` function.

## Usage

```
wkt_vis(x, zoom = 6, mptype = "terrain", browse = TRUE)
```



## Arguments

x	Input well-known text area (character)
zoom	Zoom level, defaults to 6 (numeric)
maptype	Map type, default is terrain (character)
browse	Open in browser or not. If not, gives back path to html file. Default: TRUE (logical)

## Details

Uses Mapbox's map layers, opens in your default browser

## See Also

Other bbox: [bbox2wkt](#)

## Examples

```
## Not run:
poly <- 'POLYGON((-111.06 38.84, -110.80 39.37, -110.20 39.17, -110.20 38.90,
  -110.63 38.67, -111.06 38.84))'
wkt_vis(poly)

poly2 <- 'POLYGON((-125 38.4,-125 40.9,-121.8 40.9,-121.8 38.4,-125 38.4))'
wkt_vis(poly2)

# Multiple polygons
x <- "POLYGON((-125 38.4, -121.8 38.4, -121.8 40.9, -125 40.9, -125 38.4),
(-115 22.4, -111.8 22.4, -111.8 30.9, -115 30.9, -115 22.4))"
wkt_vis(x)

# don't open in browser
poly2 <- 'POLYGON((-125 38.4,-125 40.9,-121.8 40.9,-121.8 38.4,-125 38.4))'
wkt_vis(poly2, browse = FALSE)

## End(Not run)
```

# Index

## \*Topic **package**

spocc-package, 2

as.ala, 3, 5–10  
as.bison, 4, 4, 5–10  
as.ecoengine, 4, 5, 5, 6–10  
as.gbif, 4, 5, 6, 7–10  
as.idigbio, 4–6, 7, 8–10  
as.inat, 4–7, 8, 9, 10  
as.obis, 4–8, 9, 10  
as.vertnet, 4–9, 10

bbox2wkt, 11, 33

crul::HttpClient, 16  
crul::HttpClient(), 4–6, 8, 9, 29

fixnames, 12  
fixnames(), 2

idig\_search\_records(), 7  
inspect, 13

occ, 15, 29–31  
occ(), 2, 4–10, 13, 14, 29–32  
occ2df, 27  
occ2df(), 2, 4–10, 14  
occ\_names, 21, 28, 30, 31  
occ\_names(), 17  
occ\_names\_options, 21, 29, 30, 31  
occ\_options, 21, 29, 30, 31  
occ\_options(), 16

rbison::bison(), 16, 18  
rbison::bison\_solr(), 4, 18  
rbison::bison\_tax(), 29  
rebird::ebirdgeo(), 16, 17  
rebird::ebirdregion(), 16, 17  
rebird::species\_code(), 15  
rgbif::name\_lookup(), 29, 30  
rgbif::occ\_data(), 6, 31  
rgbif::occ\_get(), 6  
rgbif::occ\_search(), 16, 17  
ridigbio::idig\_search\_records(), 16, 18  
rvertnet::searchbyterm(), 16, 20  
rvertnet::vert\_id(), 10  
rvertnet::vertsearch(), 10, 18

spocc (spocc-package), 2  
spocc-package, 2  
spocc::occ\_names\_options(), 29  
spocc\_duplicates, 32  
spocc\_duplicates(), 3, 21  
spocc\_objects, 21, 29–31

warning(), 16  
wkt2bbox (bbox2wkt), 11  
wkt\_vis, 12, 32  
wkt\_vis(), 2