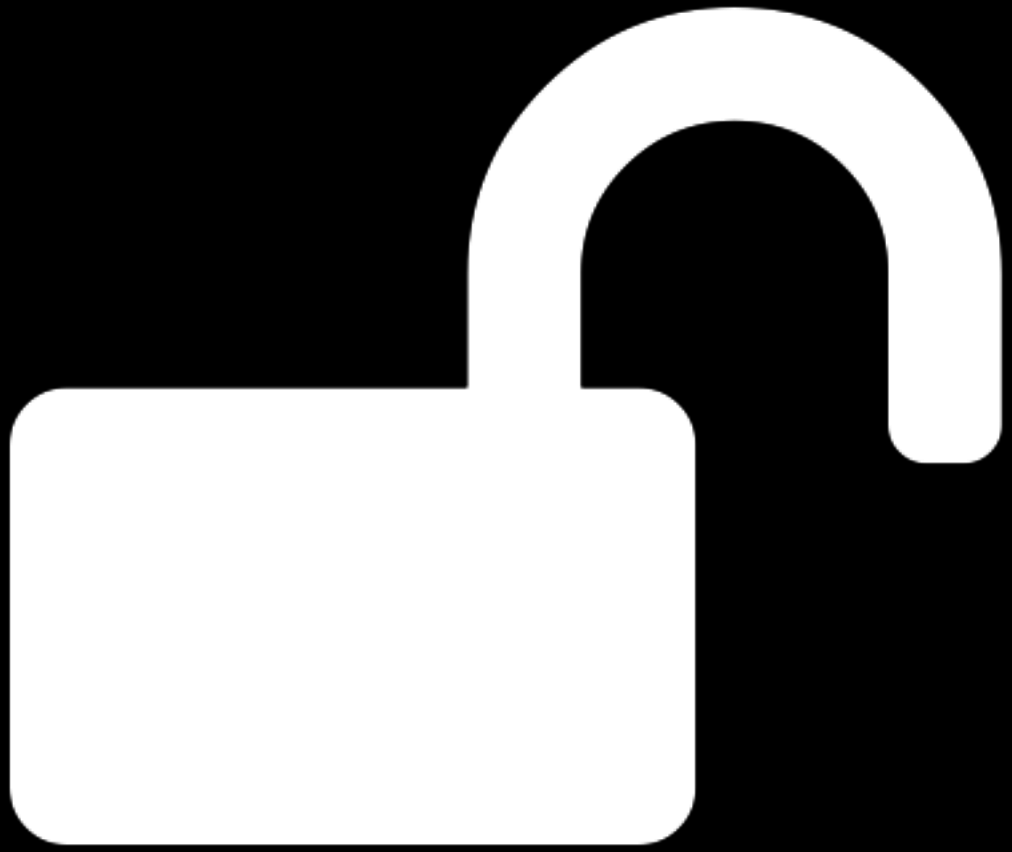
# R-based tools for open and collaborative science

@recology_
aka Scott Chamberlain

# Science needs to be more open



# We build on the knowledge of others

http://everyoneknowsbest.files.wordpress.com/2008/08/bodysculpture.jpg

**Less mistakes**

**More fortiutious findings**

**The public paid for it!**



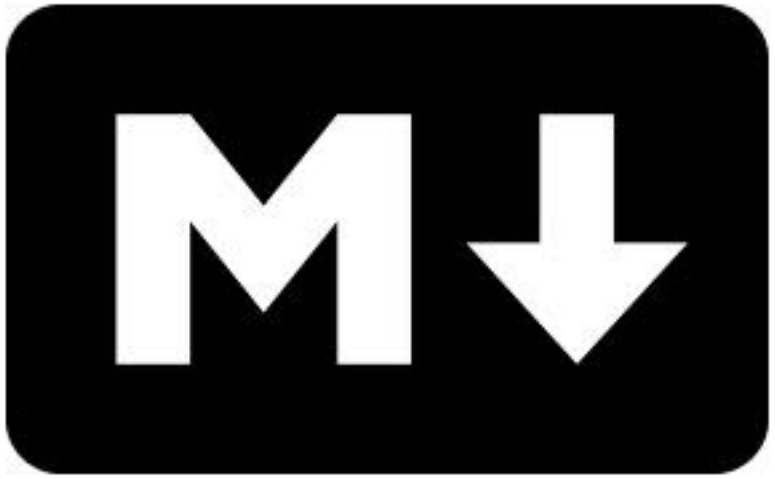

http://everyoneknowsbest.files.wordpress.com/2008/08/bodysculpture.jpg

# But we need tools to do it!!!!!

http://www.fotopedia.com/items/flickr-4796633039

# What kinds of tools? Not these

**These!!!!!!**



python

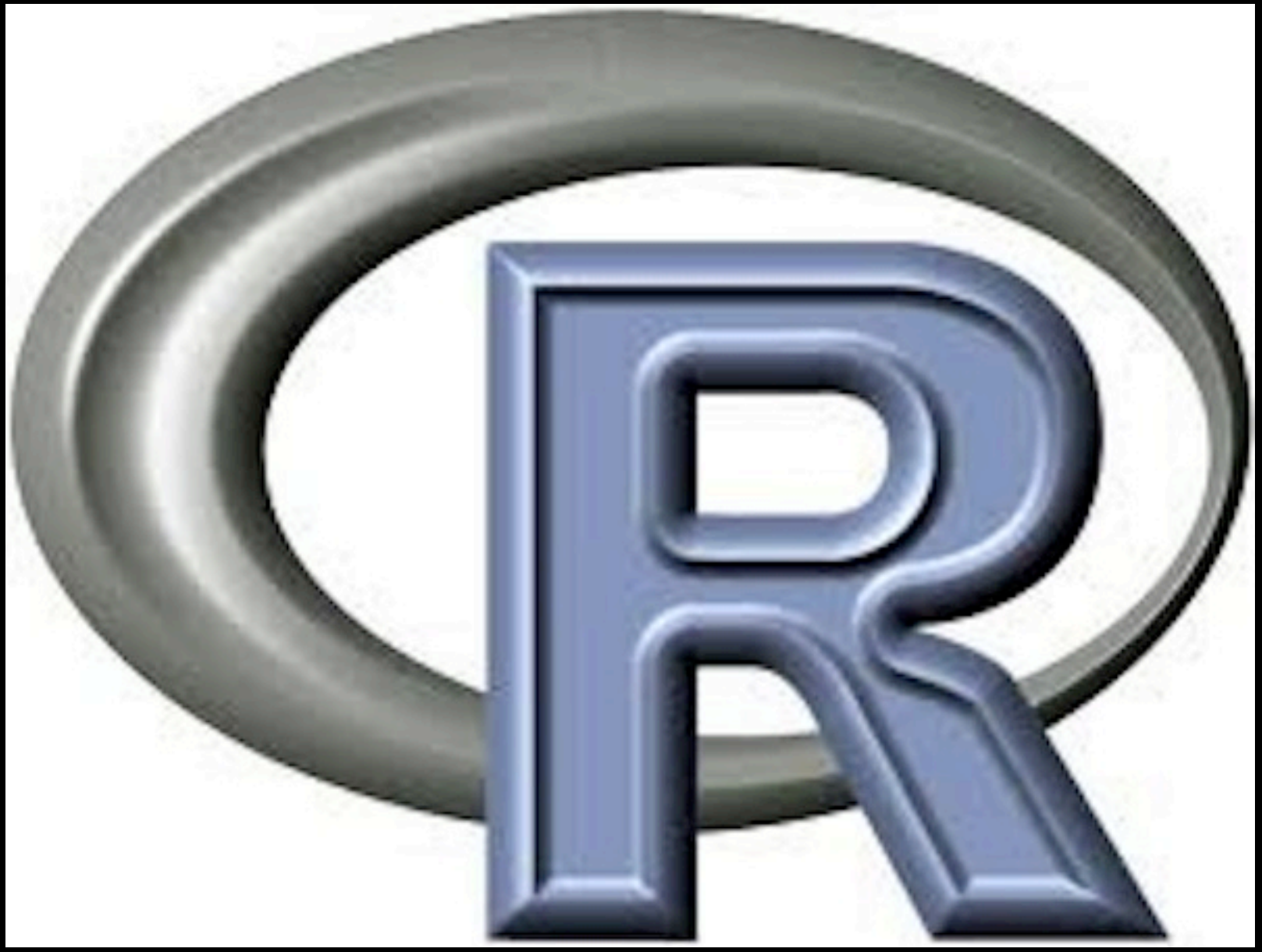
LaTeX

## What does an ecologist do?

- Collect data
- Manipulate data
- Visualize
- Analyze
- Write

# Data increasingly on the web

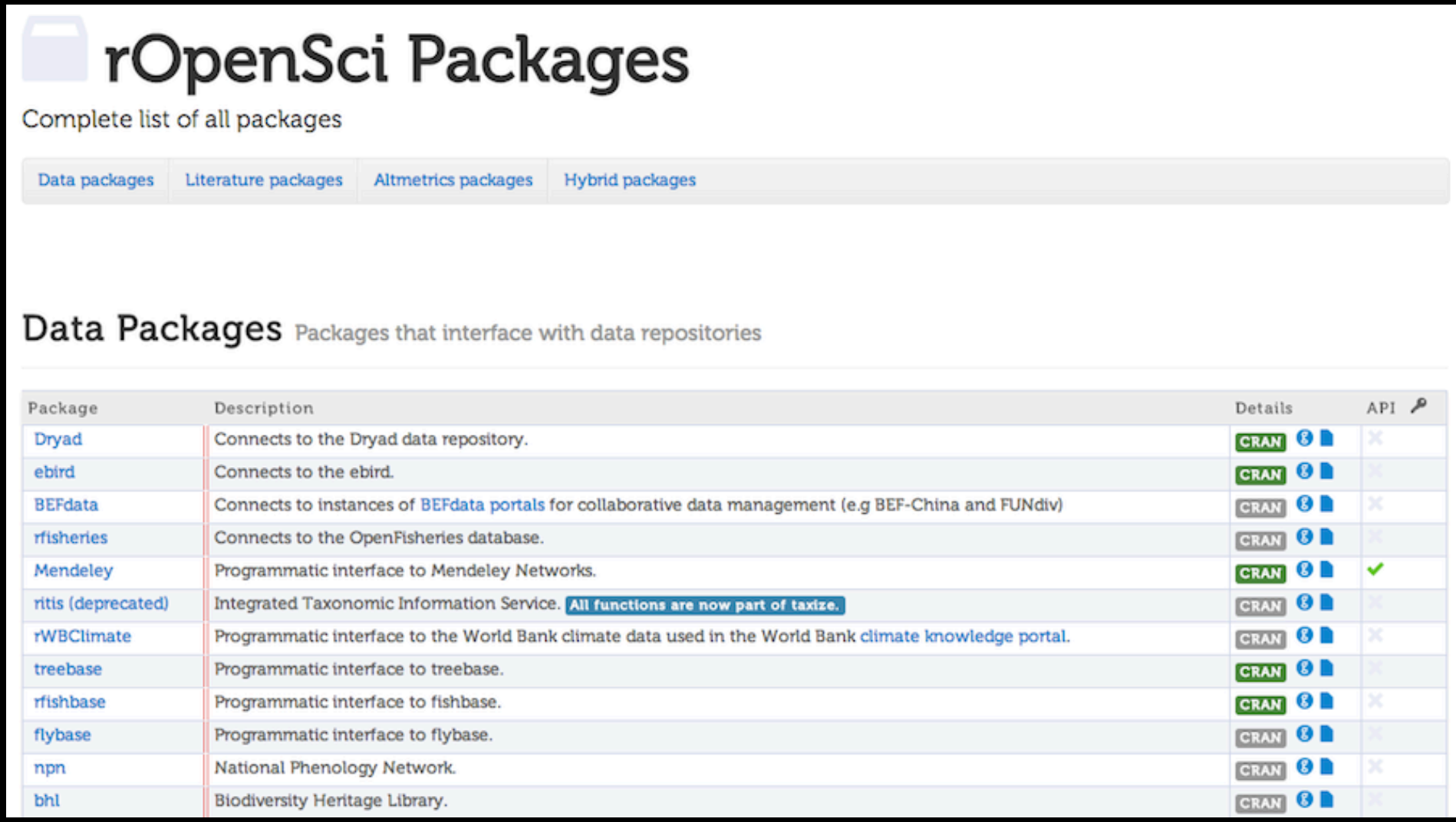
# R may be the perfect solution



## Why?

- R is Open source = Free + Rapid change
- R = entire workflow in 1 place
- R = reproducible science

# The toolbelt



# rOpenSci Packages

Complete list of all packages

Data packages | Literature packages | Altmetrics packages | Hybrid packages

## Data Packages Packages that interface with data repositories

| Package | Description | Details | API |
|---|---|---|---|
| Dryad | Connects to the Dryad data repository. | CRAN | |
| ebird | Connects to the ebird. | CRAN | |
| BEFdata | Connects to instances of BEFdata portals for collaborative data management (e.g BEF-China and FUNdiv) | CRAN | |
| rfisheries | Connects to the OpenFisheries database. | CRAN | |
| Mendeley | Programmatic interface to Mendeley Networks. | CRAN | ✓ |
| ritis (deprecated) | Integrated Taxonomic Information Service. All functions are now part of taxize. | CRAN | |
| rWBClimate | Programmatic interface to the World Bank climate data used in the World Bank climate knowledge portal. | CRAN | |
| treebase | Programmatic interface to treebase. | CRAN | |
| rfishbase | Programmatic interface to fishbase. | CRAN | |
| flybase | Programmatic interface to flybase. | CRAN | |
| npn | National Phenology Network. | CRAN | |
| bhl | Biodiversity Heritage Library. | CRAN | |

http://ropensci.org/

# Literature

**Make an API call**

```
library(RCurl); library(RJSONIO)
dat <- fromJSON(getURL("https://api.github.com/users/hadley/repos"))
```

**Manipulate the data**

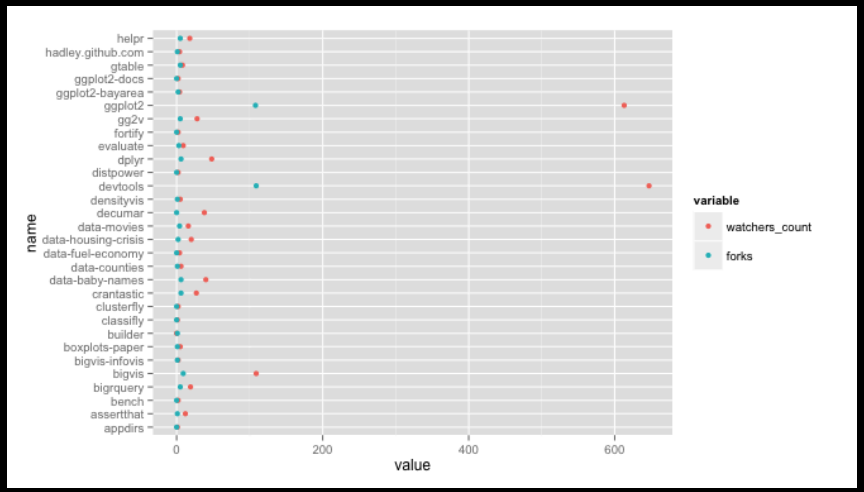
```
library(plyr); library(reshape2)
dat_melt <- melt(ldply(dat, function(x) data.frame(x[names(x) %in%
                        c("name","watchers_count","forks")])))
```

**Run some statistical model**

```
lm(value ~ variable, data = dat_melt)
```

**Visualize results**

```
library(ggplot2)
ggplot(dat_melt, aes(name, value, colour = variable)) +
        geom_point() +
        coord_flip()
```




**Write the paper**

```
# Introduction...
```

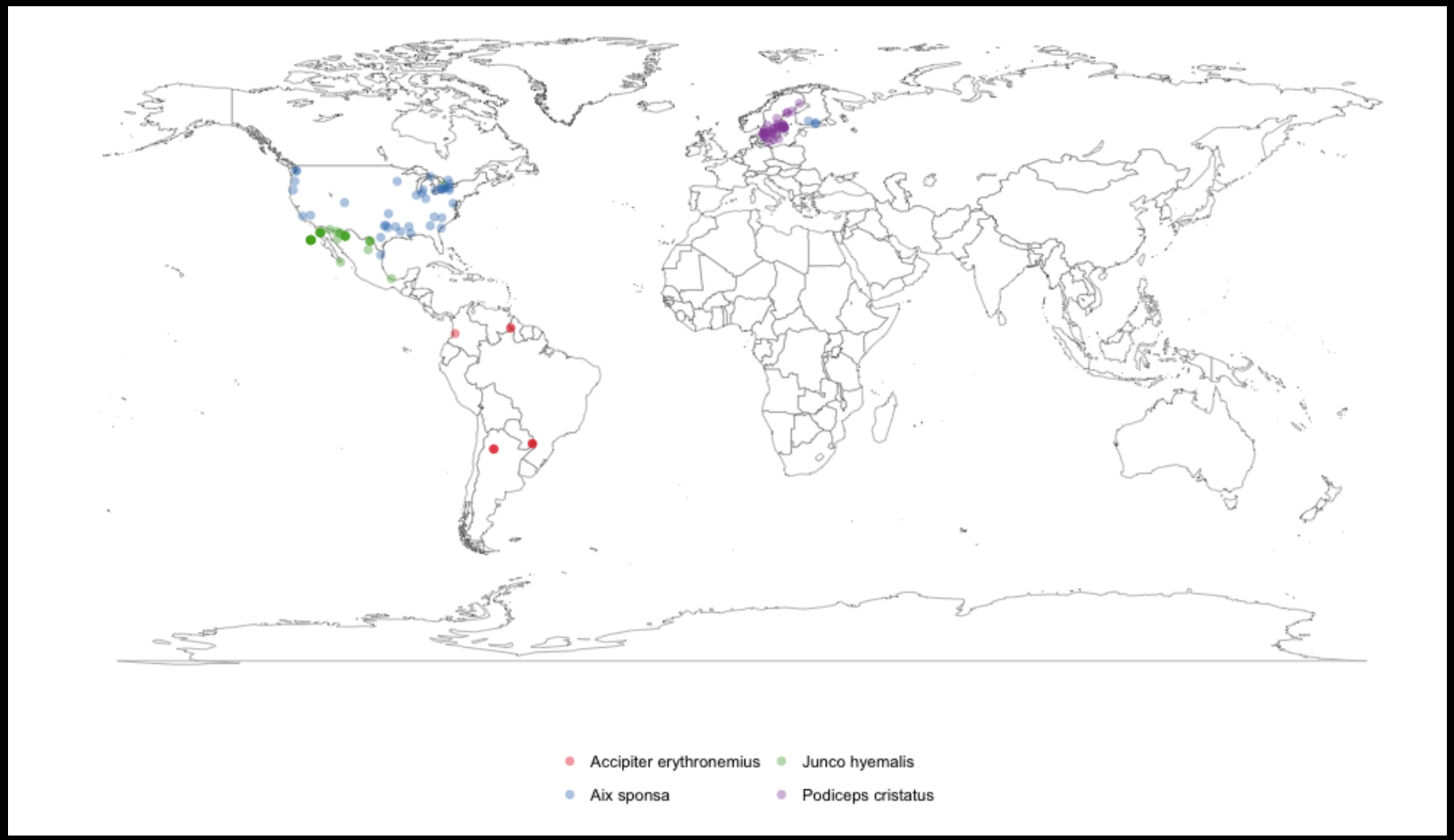
# Taxonomy

```
library(taxize)
specieslist <- "Abies procera"
classification(specieslist, db = "itis")
```

| rankName | taxonName | tsn |
|---|---|---|
| Kingdom | Plantae | 202422 |
| Subkingdom | Viridaeplantae | 846492 |
| Infrakingdom | Streptophyta | 846494 |
| Division | Tracheophyta | 846496 |
| Subdivision | Spermatophytina | 846504 |
| Infradivision | Gymnospermae | 846506 |
| Class | Pinopsida | 500009 |
| Order | Pinales | 500028 |
| Family | Pinaceae | 18030 |
| Genus | Abies | 18031 |
| Species | Abies procera | 181835 |

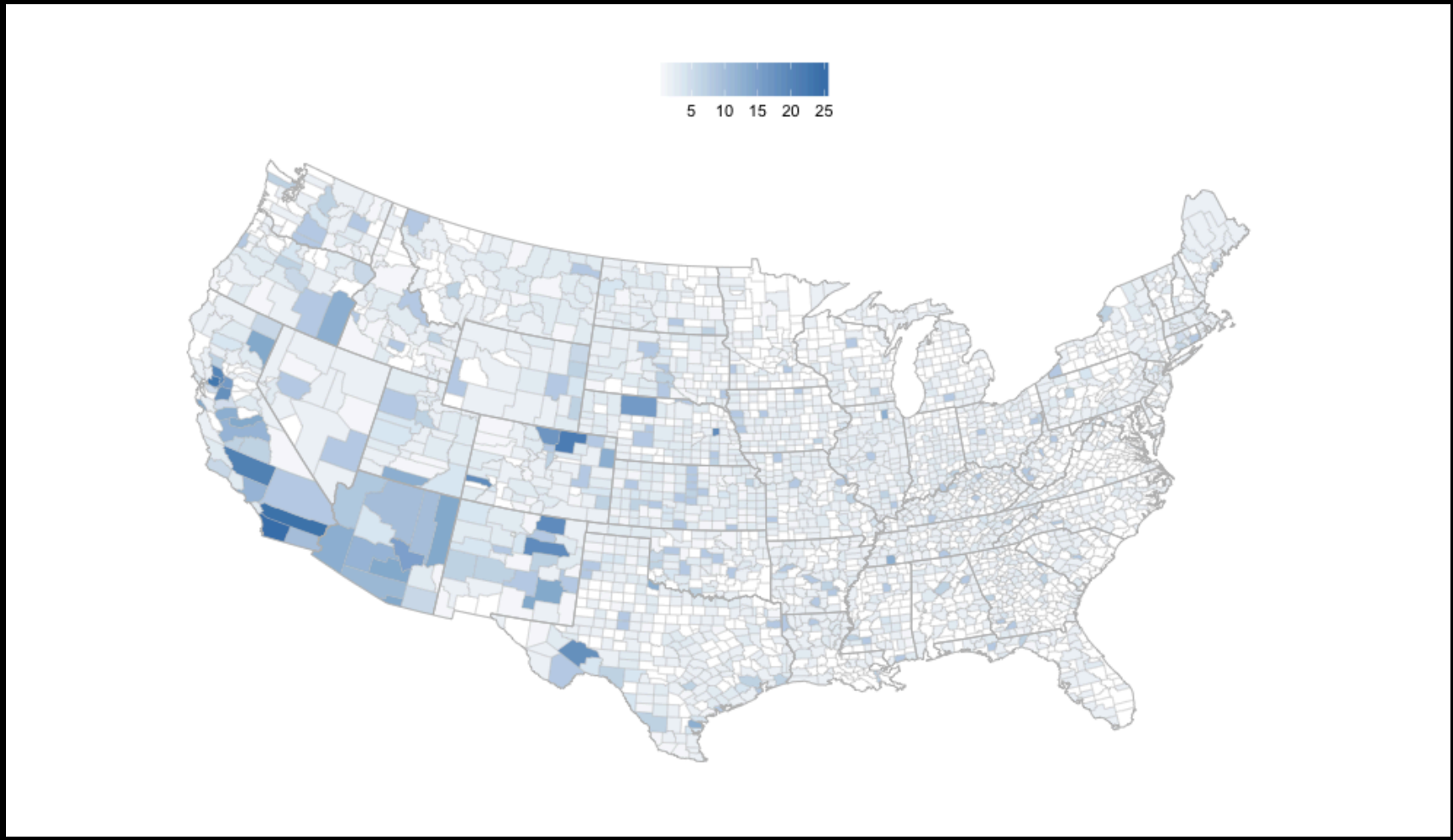
# Taxonomy

```
library(rgbif)
splist <- c('Accipiter erythronemius', 'Junco hyemalis', 'Aix sponsa', 'Podiceps cristatus')
out <- occurrencelist_many(splist, coordinatestatus = TRUE, maxresults = 40)
gbifmap_list(out)
```



## Taxonomy

```
library(rbison)
out <- bison(species="Helianthus annuus", count=500)
bisonmap(input=out, tomap="county")
```



# Take action!

FontAwesome http://fortawesome.github.io/Font-Awesome/
fontawesome 2 png https://github.com/odyniec/font-awesome-to-png

## The deets

- Presentation made using Slidify

https://github.com/ramnathv/slidify

- See it online here:

linklink