



IAVS-LAC

This Session

Reconciliation  
taxlist

Data Shapes

# From the field to the desk

## [Session 2]

Miguel Alvarez

28<sup>th</sup> April 2023



# This Session

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This Session

Reconciliation

taxlist

Data Shapes

- ▶ Taxonomic Names Resolution
- ▶ Taxonomic Lists in taxlist
- ▶ Data Formats and Shapes



# Reconciliation

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This Session

Reconciliation

taxlist

Data Shapes

## Taxonomic Names Resolution

- ▶ Taxonomy Equalization
- ▶ Taxonomic Standardization
- ▶ Taxonomic Harmonization
- ▶ Taxonomic Normalization
- ▶ Taxonomic Reconciliation

```
library(taxlist)
summary(Easplist, "Cyclosorus interruptus")

## -----
## concept ID: 50074
## view ID: 1
## level: species
## parent: 55055 Cyclosorus Link
##
## # accepted name:
## 50074 Cyclosorus interruptus (Willd.) H. Itô
##
## # synonyms (13):
## 52002 Dryopteris gongylodes (Schkuhr) Kuntze
## 52008 Thelypteris interrupta (Willd.) K. Iwa
## 52009 Cyclosorus striatus Ching
## 53097 Pteris interrupta Willd.
## 53098 Aspidium continuum Desv.
## 53099 Aspidium ecklonii Kunze
## 53100 Aspidium gongylodes Schkuhr
## 53101 Aspidium obtusatum Sw.
```



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This Session

Reconciliation

taxlist

Data Shapes

## Online Databases

[IPNI](#)

[Tropicos](#)

[TNRS](#)

[WFO](#)

[GBIF](#)

[Flora del Conosur](#)

[African Plant Database](#)



# Reconciliation

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Reconciliation

taxlist

Data Shapes

## Several R Packages

`taxize`

`Taxonstand`

Grenié et al. (2022) *Methods in Ecology and Evolution*

Daniel Laughlin, Yungas, Machu Picchu, Peru



- ▶ Object structure
- ▶ Methods for common process
  - ▶ `print()`
  - ▶ `summary()`
  - ▶ `subset()`
  - ▶ `indented_list()`

## taxlist site

Alvarez & Luebert (2018) *Biodiversity Data Journal*

taxlist 0.2.3

taxlist

CRAN 0.2.2 Peer Reviewed Rdoc DOI 10.5281/zenodo.5107156

R-CMD-check passing codecov 89%

downloads 465/month downloads 27K

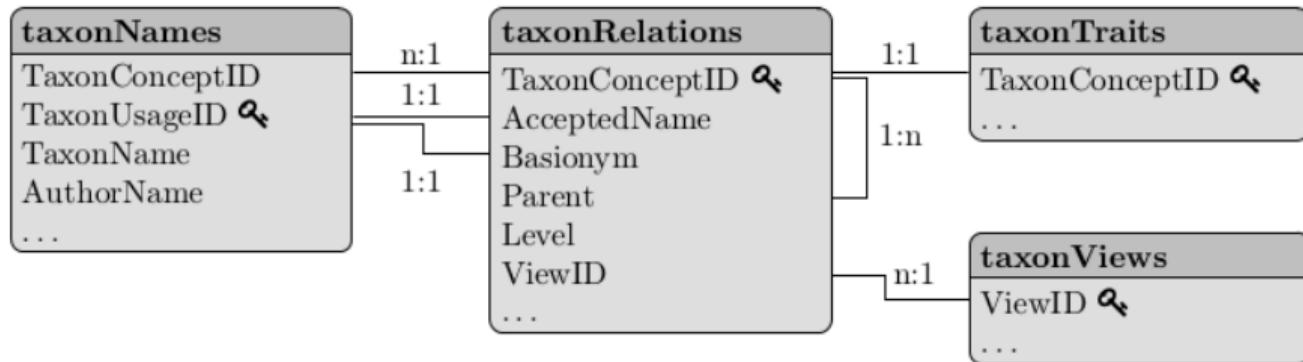
## Introduction

`taxlist` is a package designed to handle and assess taxonomic lists in R, providing an object class and functions in S4 language. The homonymous object class `taxlist` was originally designed as a module for taxa recorded in vegetation-plot observations (see [vegtable](#)), but became as an independent object with the ability of contain not only lists of species but also synonymy, hierarchical taxonomy, and functional traits (attributes of taxa).

The main aim of this package is to keep consistence in taxonomic lists (a set of rules are checked by the function `validObject()`), to enable the re-arrangement of such data, and to statistically assess functional traits and other attributes, for instance taxonomy itself (function [tax2traits\(\)](#) set taxonomic information as trait).

While this package only includes a function for the import of taxonomic lists from [Turboveg](#), almost any data source can be structured as `taxlist` object, so far the information is imported into data frames in an R session and the consistency rules are respected (validity).

The use of `taxlist` is recommended for people cleaning raw data before importing it to relational databases, either in the context of taxonomic work or biodiversity assessments. The other way around, people having relational databases or clean and structured taxonomic lists may



- ▶ Each slot is a data frame
- ▶ Consistency checked by `validObject()`



## Target Information

- ▶ Diverse degrees of completeness
- ▶ Any hierarchical taxonomy
  - ▶ Also syntaxonomy

Alvarez & Luebert (2022)  
*Vegetation Classification and Survey*

<https://syntax.kamapu.net/>

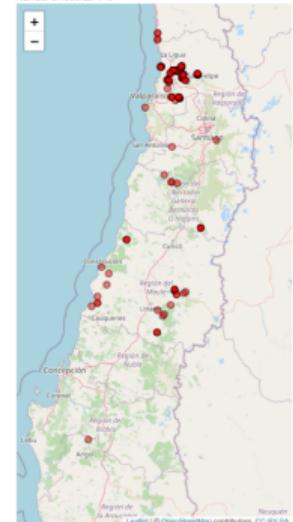
### Syntaxa of South American Vegetation

Search a syntaxon:

Lithraeo causticae-Cryptocaryetea albae Oberdorfer 1960  
Cryptocaryeta albae (Schmitthüsen 1954) Oberdorfer 1960  
Cryptocaryon albae Schmitthüsen 1954  
Lucuma valparadisea Cryptocaryum albae (Schmitthüsen 1954) Oberdorfer 1960  
= Lucuma valparadisea comm. Schmitthüsen 1954  
Bellachimedion miersii Amigo & Flores-Toro 2012  
Aestoxico punctat-Cryptocaryetum albae Amigo & Flores-Toro 2012  
Bellachimedion miersii Schmitthüsen 1954  
Bellachimedion miersii osmorrhizetosum bertero Schmitthüsen 1954  
Bellachimedion miersii typicum Schmitthüsen 1954  
Bellachimedio miersii-Criococcedrum pataguse Villaseñor & Serry ex Amigo & Flores-Toro 2012  
Cryptocaryenion albae Oberdorfer 1960  
Boldia chilensis-Cryptocaryetum albae Oberdorfer 1960  
Kagereria angustifoliae-Quillaja saponariae Amigo & Flores-Toro 2013  
Colliguao integrimmae-Quillaja saponariae Amigo & Flores-Toro 2013  
Musio latifoliae-Quillaja saponariae Amigo & Flores-Toro 2013  
Schino montanae-Austrococcedrum chilense Amigo & Flores-Toro 2013  
Lithraeo causticae Schmitthüsen 1954  
Azara dentatae-Lithraetum causticarum Amigo & Flores-Toro 2013  
Boldia chilensis-Lithraetum causticarum (Schmitthüsen 1954) Oberdorfer 1960  
= Lythraea causticae-Pithecellobia boldiae comm. Schmitthüsen 1954  
Lomatia hispidae-Lithraetum causticarum Amigo, San Martín & Quintanilla 2000  
Jubaea spectabilis-Lithraetum causticarum Schmitthüsen 1954  
Austrococca chilensis Lithraetum causticarum Oberdorfer 1960  
Acacia cavenii-Cestrum paraguense Oberdorfer 1960  
Cestrum paraguense-Trevoetum trinerviae Oberdorfer 1960  
Azara glauca-Escalloniagetum berterianae Oberdorfer 1960

### Plot Observations

Number of records: 146



Elizabeth Feldmeyer-Christe, cushion bogs, Tierra del Fuego, Argentina





# Data Shapes

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This Session

Reconciliation

taxlist

Data Shapes



## Vegetation-plot observation Phytosociological relevés

- ▶ Abundance/presence of species in plot
- ▶ Environmental variables
- ▶ Species attributes
  - ▶ Life forms
  - ▶ Chorology
  - ▶ Functional traits
  - ▶ Taxonomy



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Reconciliation

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**Data Shapes**

... served to the readers

... served to the statistical software

Table 2. *Tessario absinthioidis-Baccharidetum marginalis* Oberd. 1960

Riverbank composition: R/r = rocks (> 50 cm Ø); G/g = gravel (< 50 cm Ø); indicate abundant, lowercase scarce; (x) = xenophytic plant

Altitude (m asl)	160	225	1110	1055	505
Area (m <sup>2</sup> )	80	180	100	250	200
Slope (°)	0	0	0	10	0
Cover E <sub>i</sub> (%)	100	85	100	60	70
High shrub layer (m)	5–8	3–8	1–3	1–2	1–2.5
Riverbank composition	gsL	gS	rGS	rGS	rGS
Latitude	34° 03'	34° 22'	35° 02'	35° 02'	35° 42'
N. species	11	10	14	9	13
N. relevé	1	2	3	4	5
<i>Baccharidetea / Salicetea species</i>					
<i>Baccharis salicifolia</i>	1	3	3	3	4
<i>Otholobium glandulosum</i>	2	1	.	.	3
<i>Cortaderia gr. selloana</i>	.	r	1	+	1
<i>Salix humboldtiana</i>	4	4	.	.	.
<i>Tessaria absinthioides</i>	.	3	4	3	+
<i>Equisetum bogotense</i>	.	.	2	.	1
<i>Discaria trinervis</i>	.	.	3	.	.
<i>Buddleja globosa</i>	.	.	+	.	.
<i>Escallonia myroidea</i>	.	.	+	.	.
<i>Myrceugenia lanceolata</i>	.	.	+	.	.

	## Adesparv	Bromtris	Cardramo
## 6216	1	1	1
## 6217	0	1	0
## 6218	0	0	0
## 6219	0	0	0
## 6220	0	0	0
## 6221	0	0	0
## 6222	0	0	0
## 6359	0	0	0
## 6360	0	1	1
## 6361	0	1	0
## 6362	0	1	0
## 6523	0	1	0
## 6524	0	1	0
## 6574	0	0	0
## 6575	0	0	0
## 6576	0	1	1
## 6577	0	0	0
## 6578	0	0	0
## 6579	0	0	0
## 6580	0	0	0
## Crasdecu			
## Dichseri			
## 6216	1	1	
## 6217	0	0	



# Data Shapes

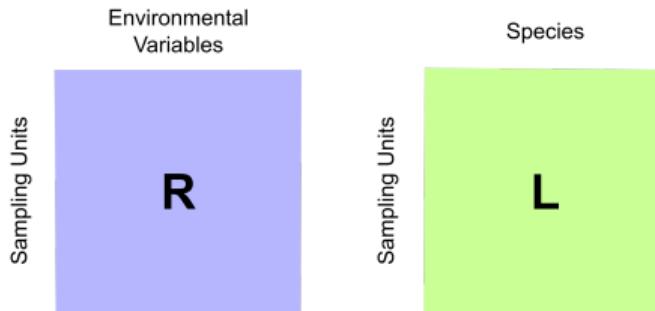
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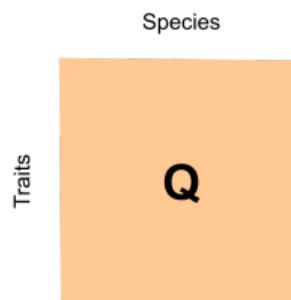
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- ▶ **R** environmental table (header)
- ▶ **Q** species-trait table (vegetation matrix)
- ▶ **L** species composition table (species attributes)



Dolédec et al. (1996) *Environmental and Ecological Statistics*



# Data Shapes

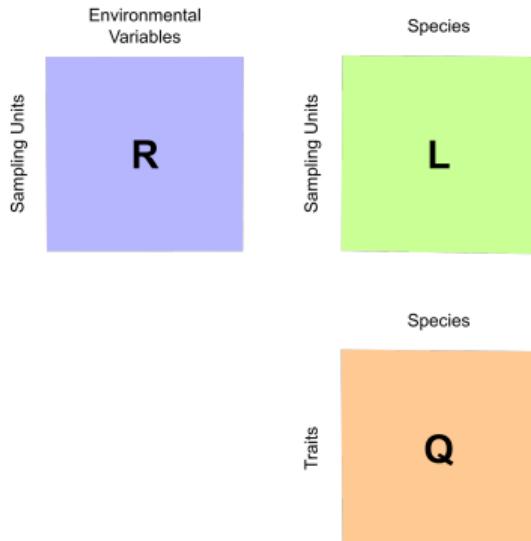
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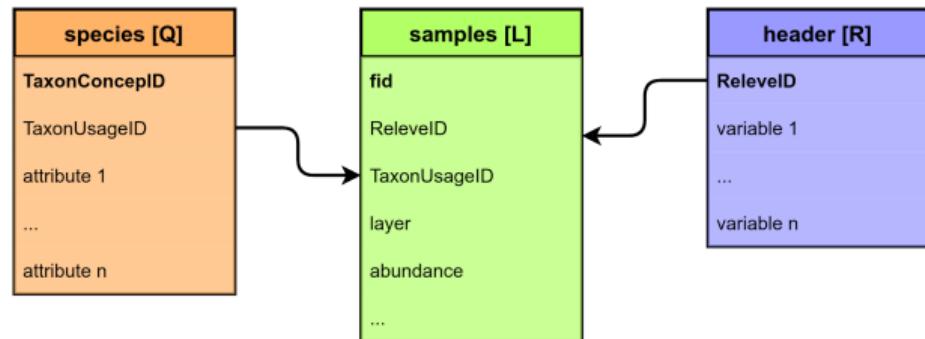
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**Data Shapes**



## Relational database schema



- ▶ Efficient storage
- ▶ Efficient data assessment?
- ▶ Little redundancy
- ▶ Consistency



# Data Shapes

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## Vegetation matrix cross table

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```
##      Adesparv Bromtris Cardramo
## 6216      1      1      1
## 6217      0      1      0
## 6218      0      0      0
## 6219      0      0      0
## 6220      0      0      0
## 6221      0      0      0
## 6222      0      0      0
## 6359      0      0      0
## 6360      0      1      1
## 6361      0      1      0
## 6362      0      1      0
## 6523      0      1      0
## 6524      0      1      0
## 6574      0      0      0
## 6575      0      0      0
## 6576      0      1      1
## 6577      0      0      0
## 6578      0      0      0
##      Crasdecu Dichseri
## 6216      1      1
## 6217      0      0
```

## Database list column-oriented table

```
##      record_id ReleveID codename cover
## 9329      137451    7993 Hypoglab   1
## 9330      137452    7993 Lythhyss   1
## 9331      137453    7993 Micrnana  1
## 9332      137454    7993 Piluamer  1
## 9333      137455    7993 Psilbrev  1
## 9335      137457    7993 Isolcern  2
## 9337      137459    7993 Plagsess  1
## 9338      137460    7994 Lythhyss  1
## 9339      137461    7994 Piluamer  1
## 9340      137462    7994 Psilbrev  1
## 9343      137465    7994 Plagsess  1
## 9344      137466    7994 Isoëhier  1
## 9345      137467    7258 Agrocapi  1
## 9346      137468    7258 Bromtris  1
## 9347      137469    7258 Erodmala  1
## 9348      137470    7258 Hypoglab  1
## 9349      137471    7258 Juncbufo  1
## 9350      137472    7258 Lepuspat  1
```

A photograph of a mangrove forest. The scene is framed by large, leafy mangrove trees on both sides. A narrow, dark green waterway or canal cuts through the center. The sky above is filled with heavy, grey clouds.

**Thank You!**

Jesse Fleri, mangrove, Gilligan's Island, Puerto Rico