



# PLAZI

TAKING CARE OF FREEDOM

<https://plazi.org/>







# DATA REUSE

Building knowledge from digital data  
repositories

Julia Giora  
Donat Agosti

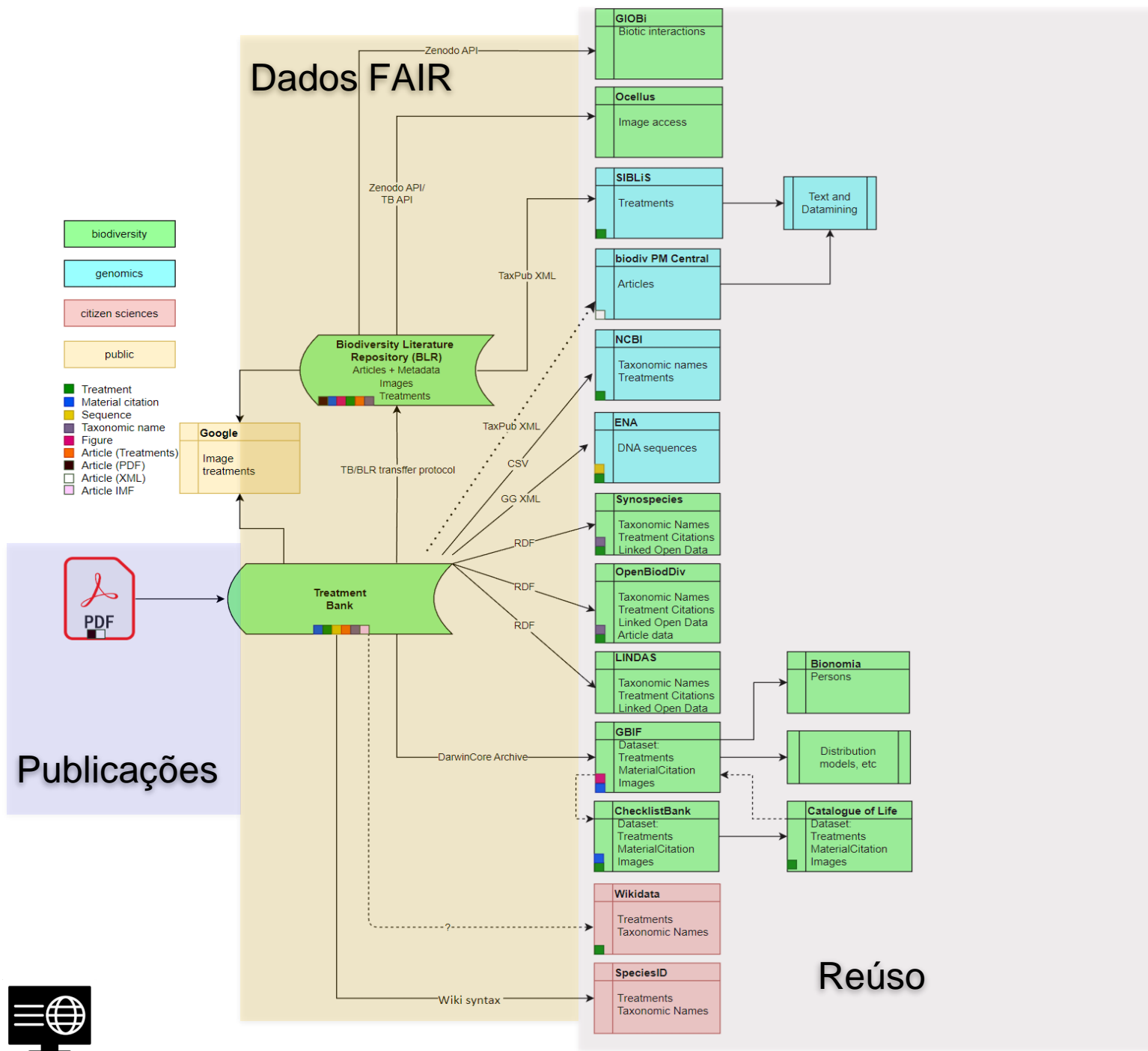


# FAIR Data Reuse





# ► From publication to reuse





## ► Treatments as digital objects

[illegible][illegible]

- Findable
- Accessible
- Interoperable
- Reusable

Treatment [DOI](#)  
Journal article BLR [Record](#)  
Article [DOI](#)





# ► Treatments as digital objects





# ► Treatments as digital objects

**Zenodo Record:** Review of South African Euryphyminae. Tshillo, Precious (2020). Zootaxa 4820 (1): 70-104. DOI: <https://doi.org/10.11646/zootaxa.4820.1.4>

**Biodiversity Literature Repository:** *Calliptamuloides minimus*: Dirsh 1956. Published in: Zootaxa 4820 pp. 70-104 (1). DOI: [10.11646/zootaxa.4820.1.4](https://doi.org/10.11646/zootaxa.4820.1.4)

**OpenAIRE:** *Calliptamuloides minimus*: Dirsh 1956. Published in: Zootaxa 4820 pp. 70-104 (1). DOI: [10.11646/zootaxa.4820.1.4](https://doi.org/10.11646/zootaxa.4820.1.4)

**GBIF Species:** <https://www.gbif.org/species/1703942>

**GBIF Occurrence:** <https://www.gbif.org/occurrence/3015409563>

**BLR Taxonomic Treatment:** <https://doi.org/10.5281/zenodo.4397319>

**BLR Article:** <https://zenodo.org/record/4397315>

**PDF:** <https://doi.org/10.11646/zootaxa.4820.1.4>

**Calliptamuloides minimus Dirsh, 1956**

**Preserved specimen**

**Occurrence = materials citation**

**Type: Balochistan, Zhob district, Qamardin Karez, Khutkandai, 31°31'31"N 68°14'38"E, Nazar Khan Mandokhel, 24 April, 2020 (RAW101342).**

GBIF species: <https://www.gbif.org/species/1703942>

GBIF occurrence: <https://www.gbif.org/occurrence/3015409563>

BLR Taxonomic treatment: <https://doi.org/10.5281/zenodo.4397319>

BLR Article: <https://zenodo.org/record/4397315>

PDF: <https://doi.org/10.11646/zootaxa.4820.1.4>



# ► Integrating FAIR data – Biodiversity PMC

Search | Collections | API | About

**SIBILS**  
SWISS INSTITUTE OF BIOINFORMATICS  
LITERATURE SERVICES

Biodiversity PMC

Enter your query:

☐ Advanced options

Examples

Search examples

Find all documents about assassin bugs

Question-answering examples

The question-answering mode is limited to MEDLINE and PLAZI collections.

What diseases are associated with ticks?

What is the gestation time of pangolins ?

What is the tail size of pangolins ?

When is the sexual maturity of pangolins ?

Where potamopyrgus antipodarum are invasive ?

What species can be vector of eggs of Dermatobia hominis ?

Search





# ► Integrating FAIR data – BiotXplorer



BiotXplorer

searching biotic interactions in the literature

Please note this demonstrator is in development. We apologize for any inconvenience this may cause and appreciate your patience as we continue to improve the demonstrator. If you have any questions or concerns, please feel free to [contact us](#).

Query

Species 1:

*Example: pangolins*

☒ Orcinus orca [124215]

Or select another taxonomic entity:

- ☐ Orcinus [124219]
- ☐ Hyperoodon [1003908]
- ☐ Pseudorca crassidens [209644]
- ☐ Orcaella brevirostris [1003911]
- ☐ Tatia orca [7065975]

[\[+\] More](#)

Species 2:

*Example: cats*

☒ Eudyptes [494364]

Or select another taxonomic entity:

- ☐ Pteria penguin [335715]
- ☐ Adelie penguin guano bacterium 83 [4746345]
- ☐ Adelie penguin guano bacterium 70 [4746346]
- ☐ Adelie penguin guano bacterium 2 [4746347]
- ☐ Adelie penguin guano bacterium 258 [4746348]

[\[+\] More](#)

Interaction:

*Example: host of*

Examples

Which species do/can interact with pangolins?

What is the interaction between Oncomelania hupensis and Schistosoma japonicum?

Which species are host of Biomphalaria glabrata?

What is the interaction between Phengaris arion and Myrmica sabuleti

Search





# ► Integrating FAIR data

- A global service for biodiversity and the natural sciences community
- Bridging the gap between biodiversity and other domains
- Model for reusing scientific data for other domains and how to publish data
- Contribution to better data for biodiversity conservation





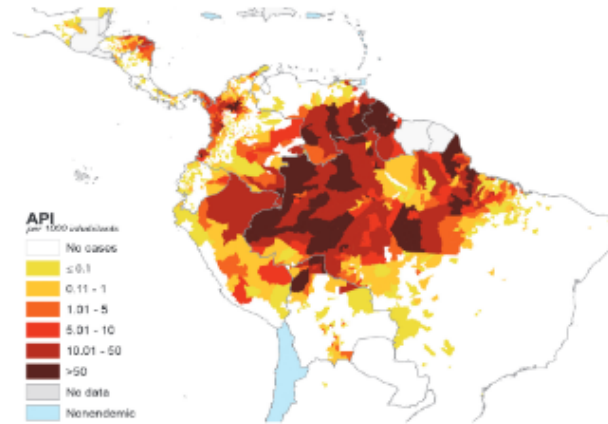
# ► Integrating FAIR data – hasdai repositories

hasdai

research projects

repositories

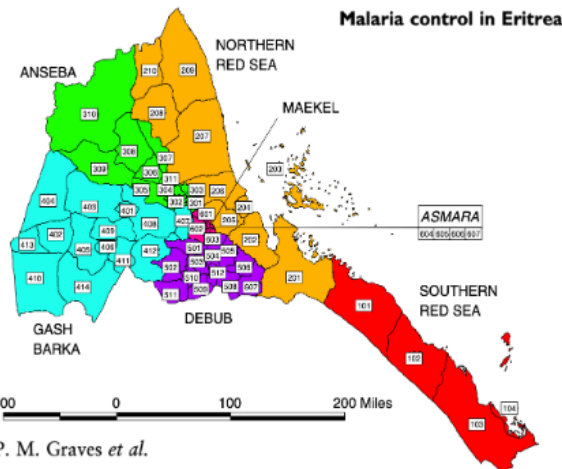
Search



ongoing work to eliminate the disease.

## Vector Disease Literature Corpus

Vecnet was founded in 2011 as part of the Malaria Eradication Research Agenda (malERA) initiative. The number of malaria cases remains between 350 and 500 million people worldwide each year; up to one million of these cases lead to death. The malERA experts concluded that the first step in malaria elimination requires widespread access to, and the means to analyze all existing literature relating to malaria. Unfortunately by 2019 an important Vecnet data resource became unfunded and this repository has been redelivered by Data Futures for long-term sustainability as well as supporting



P. M. Graves *et al.*

Search by Title

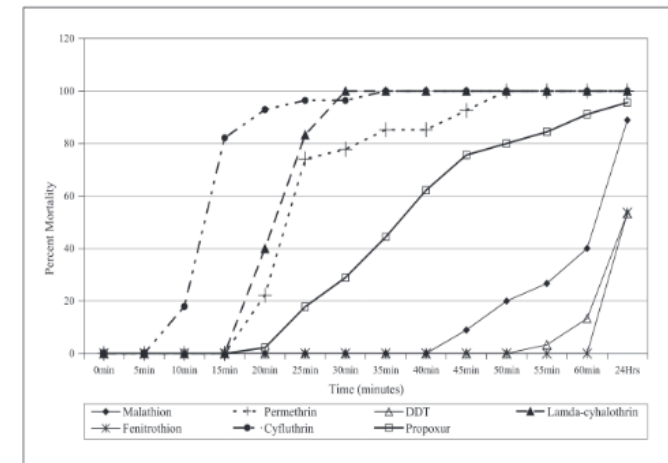


Figure 1. Percent mortality of *Ae. aegypti* malathion strain (F44) exposed to different insecticides

Search by Author





# ► Integrating FAIR data – COVID-19 Task Force

[TREATMENTBANK](#)[BIODIVERSITY LITERATURE REPOSITORY](#)[SERVICES](#)[HOW TO PARTICIPATE](#)[ABOUT](#)

## Plazi and Pensoft launch an initiative to provide access to scholarly published data about Coronavirus hosts

🕒 April 03, 2020

Read the [Eurekalert!](#) and [Knowedge Speak](#) release.

The COVID-19 pandemic presumably started with the escape of the Coronavirus from its bat host to humans. To understand the original host, it is important to have access to relevant scientific knowledge about these organisms. The scientific results from charting the world's biodiversity reside in a vast corpus, which is often "imprisoned" by paywalls, copyright laws or trapped in formats unfavorable to text and data mining. For the majority of the world's species, there exist only one or a few articles providing descriptions of the species or adding some additional observations. Even for well-known groups such as birds and mammals, access to primary taxonomic literature requires extensive and time-consuming specialist searches. Bats, suspected hosts of COVID-19 and other viruses such as Ebola, are particularly poorly covered [Catalogue of Life](#) and [ITIS](#), and most taxonomic information is locked within commercial closed-access books and scholarly articles.

The current COVID-19 pandemic is also just one of the many occasions in which rapid access to all possible data is crucial. There is already evidence for a possible link between the escape of SARS-like (coronaviruses) viruses from bats to humans. Potential hosts include a variety of animals, including pangolins, bats, snakes and civets. The evidence supporting these claims spans from the early 2000's up to papers published shortly after the Wuhan outbreak (Li et al. 2005, Menachery et al. 2015, Hou et al. 2017, Zhou et al. 2020, [Lam et al. 2020](#)). Nonetheless, no dedicated large-scale study on potential hosts, nor efforts to mine data and compile the taxonomic information available for these known reservoirs have been made.

For that reason, and in alignment with the recently announced [DiSSCo](#) and [CETAF COVID-19 Task Force](#) intended to create an efficient network of taxonomists, collection curators and other experts from around the globe, Plazi together with [Pensoft](#) are launching an initiative to make broadly accessible taxonomic and other biological traits data about the hosts or vectors of the SARS-CoV-2 or other coronaviruses. We will locate, acquire publications relating to the virus' hosts and deposit in a newly formed [Coronavirus-Host Community](#), a repository hosted on the [Zenodo](#) platform, which will provide persistent open access to these publications, enhanced with taxonomy specific data derived from the sources through text and data mining processes. Currently accessible data on the Biodiversity Literature Repository is accessible [here](#) and will be shared with the Coronavirus-Host community.





# ► Integrating FAIR data – Biodiversidade e conservação



## HARMONIZING TAXONOMIC RESOURCES IS NECESSARY FOR NOVEL INSIGHTS INTO BAT ROOSTING DATASET

▶

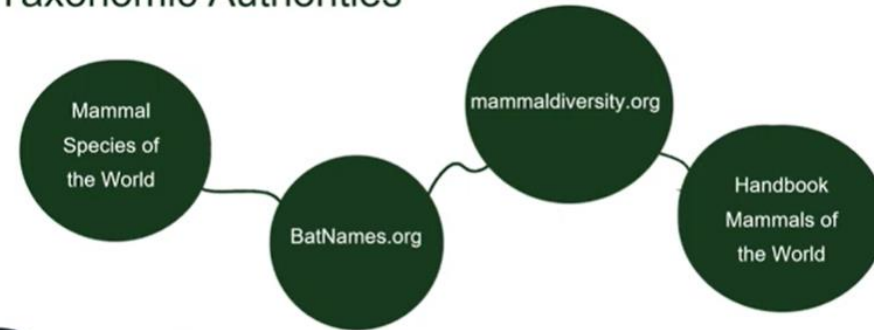
AJA SHERMAN, CULLEN GEISELMAN, NANCY SIMMONS, JORRIT  
POELEN, DEEANN REEDER, NATHAN UPHAM, DONAT AGOSTI,  
KENDRA PHELPS



### Applications

- Taxonomic revision
- Relational databases
- Data mining
- Bioinformatics
- Data aggregates
- Ecologists
- Museum collection staff

### Taxonomic Authorities



MSW3	HMW	BatNames	MDD	IUCN	BatNames 2023
synonym of Artibeus lituratus palmarum	synonym of Artibeus lituratus palmarum	Artibeus intermedius	synonym of Artibeus lituratus		Artibeus intermedius

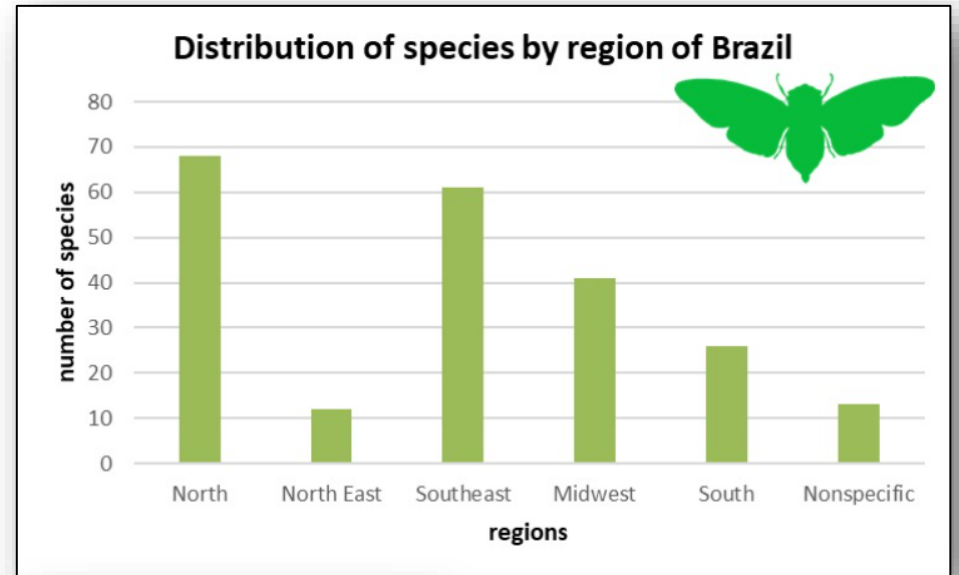
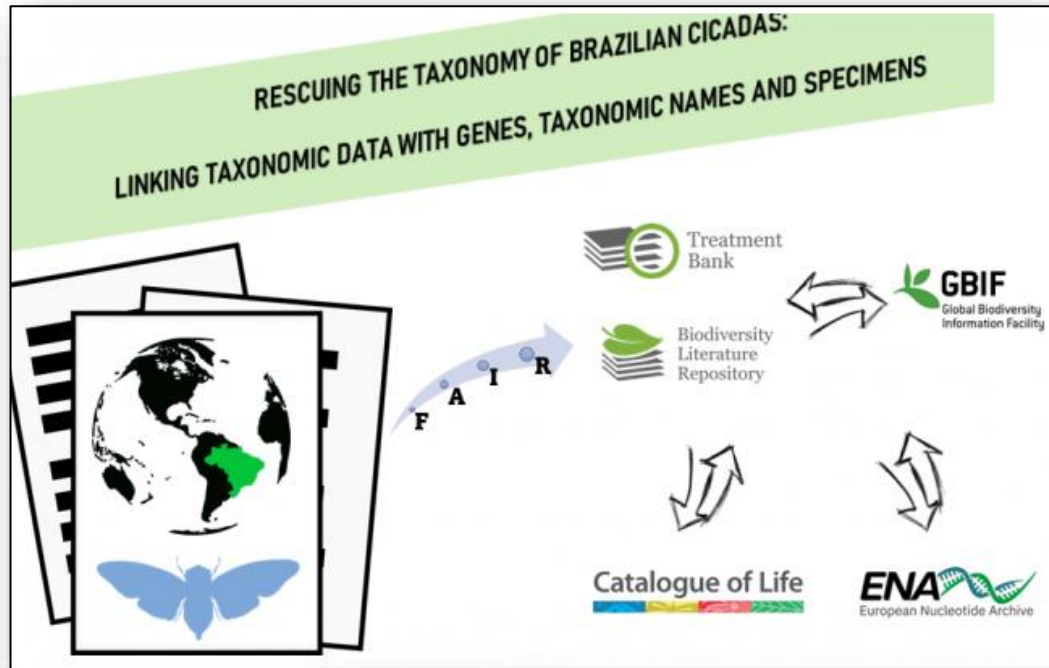
### Alignment

Name_MSW3	Name_HMW	Name_BatNames	Name_MDD	Name_IUCN	Name_BatNames_2023
synonym of Artibeus lituratus palmarum	synonym of Artibeus lituratus palmarum	Artibeus intermedius	synonym of Artibeus lituratus		Artibeus intermedius





# ► Integrating FAIR data – Biodiversidade e conservação



## Project Coordinator

Tatiana Petersen Ruschel, Plazi, Brazil

## Project Members

- Vera Lúcia Martins Nunes, University of Lisbon, Portugal
- Paula Cristina Freire Pinto Simões, University of Lisbon, Portugal
- Douglas Henrique Bottura Maccagnan, State University of Goias, Brazil
- Christian Schoebel, Envu, Germany

## BiCIKL Contact person

Donat Agosti, Plazi

## BiCIKL Research Infrastructures involved

TB, BLR, BHL, Zenodo, COL, and GBIF

## Biodiversity data classes and services included

- Literature and taxonomic names (TB, ChecklistBank, COL, BLR, BHL)
- Occurrence ID and specimens (GBIF); genes (ENA)





## ► Integrating FAIR data – Biodiversity and conservation

- Cicadas are a neglected taxonomic group in Brazil, with 160 species recorded for the country.
- Databases are useful by storing and providing access to a wide variety of information in just one place.
- Objective: to create a database for the Cicadidae of Brazil containing a list of valid species and relevant information
  - synonyms,
  - treatments,
  - treatment quotes,
  - identification keys,
  - material citations,
  - figures,
  - link to types and link to genes.
- FAIR data: available at TreatmentBank, BLR, Catalog of Life European Nucleotide Archive.





# ► Integrating FAIR data – Researcher contribution

Grazia

Zootaxa 4958 (1): 012–033  
<https://www.mapress.com/j/zt/>  
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**Article**  
<https://doi.org/10.11646/zootaxa.4958.1.4>  
<http://zoobank.org/urn:lsid:zoobank.org:pub:C5073571-45B4-46EA-9C0A-89095D633F39>

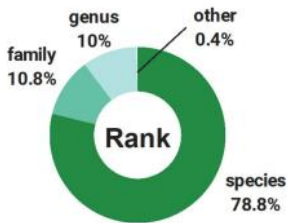
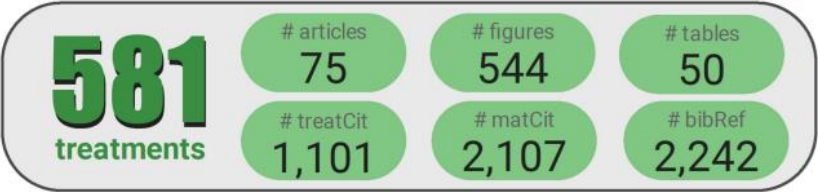
**ISSN 1175-5326 (print edition)**  
**ZOOTAXA**  
ISSN 1175-5334 (online edition)

**Using taxonomic treatments to assess an author’s career: the impactful Jocélia Grazia**

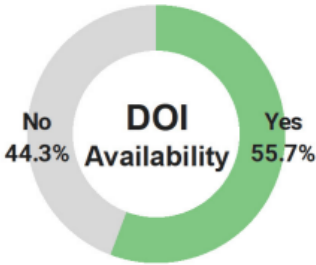
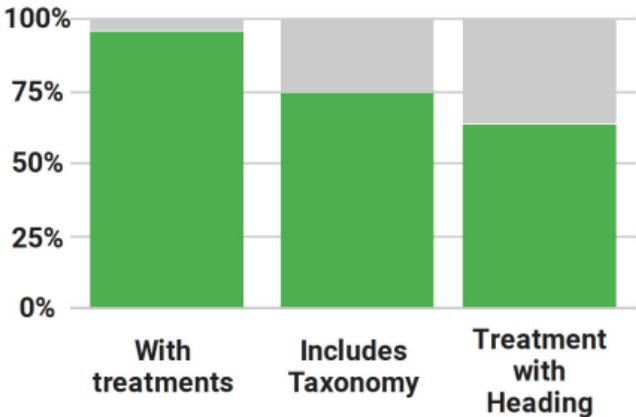
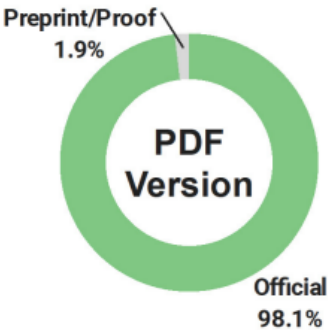
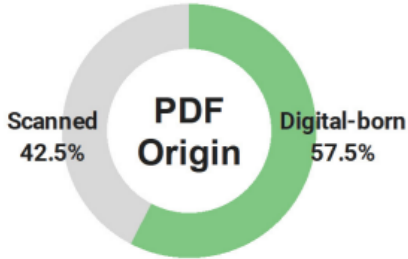
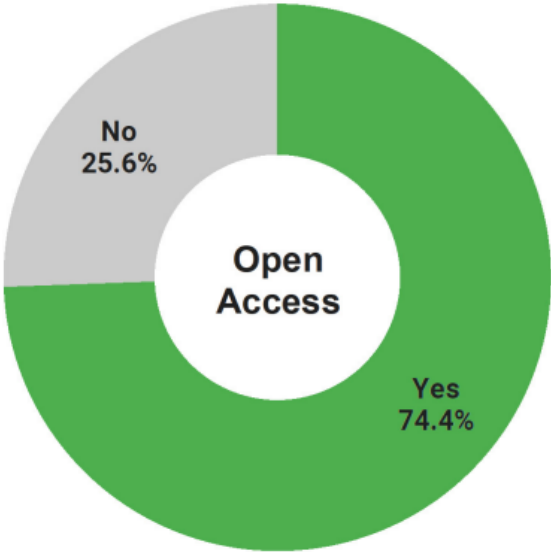
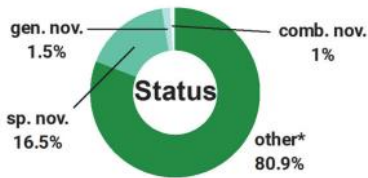
MARCUS GUIDOTTI\*, FELIPE LORENZ SIMÕES<sup>1,3</sup>, TATIANA PETERSEN RUSCHEL<sup>1,4</sup>, VALDENAR DA ROSA GONÇALVES<sup>1,5</sup>, CAROLINA SOKOLOWICZ<sup>1,6</sup> & DONAT AGOSTI<sup>2</sup>



## liberated data report



## taxonomic overview





# ► TreatmentBank statistics

- Consulting the processed data

Article UUID	Article DOI	Zenodo Deposition ID	Document Title
A8328E09FF90FF91D475FFCC9A46FFB5	10.11646/phytotaxa.9.1.11	4895325	20,000 species and five key markers: The status of molecular bryophyte phylogenetics
FFFF182B3E63FF94FFF8FF9D494A160E	10.11646/phytotaxa.66.1.9	5065924	A 150 year-old mystery solved: Transfer of the rheophytic endemic liverwort <i>Myriocolea irrorata</i> to <i>Colura</i>
D824FFD86137FFC2FFD68A35FFD4FFF3	10.11646/phytotaxa.71.1.2	5066399	A bibliographic note on the first checklist of vascular plants of Zomin (also Zaamin, formerly Guralash) Nature Reserve, Uzbekistan
FFAEFFE3FFFFFD44818FFE7FF97AC31	10.11646/phytotaxa.183.1.3	5151297	<i>Abies jaliscana</i> (Pinaceae): A new combination in section <i>Grandis</i> and a key to the species of <i>Abies</i> in western Mexico
F326FFFA4671FF81FF8BFFB8FFDBFF83	10.11646/phytotaxa.90.1.1	0	About the circumscription of <i>Celosia argentea</i> (Amaranthaceae) and the related Linnaean taxa

Year of Publication	Journal / Publisher	Volume	Number of Treatments	Number of Materials Citations
2010	Phytotaxa	9	0	0
2012	Phytotaxa	66	3	1
2012	Phytotaxa	71	3	0
2014	Phytotaxa	183	2	79
2013	Phytotaxa	90	5	2





# ► Article stats (DIO)

- Selecting fields of interest

### Plazi Article Collection Statistics

#### Document & User Data

Article UUID Document Name Article DOI Article Handle Article HNS ID Article ZooBank ID Article GBIF Dataset ID

Book ISBN Journal ISSN Zenodo Deposition ID PubMed ID PubMed Central ID Document Language

User to first Upload Document Timestamp of first Upload Year of first Upload Month of first Upload User to last Update Document

Timestamp of last Update Year of last Update Month of last Update

#### Bibliographic Metadata

Document Author Document Title Date of Publication Year of Publication Decade of Publication Document Origin

Journal / Publisher Volume Verbatim Volume Issue Verbatim Issue Numero Verbatim Numero First Page Last Page

HNS Document ID URL of PDF Version

#### Bibliographic Metadata for Display

Bibliographic Reference Document Author Document Title

#### Author Data

Name Affiliation Email LSID ORCID URL





# ► Article stats (DIO)



Content Summary Data									
Number of Pages	Number of Treatments	Number of Treatments with New Names	Number of Treatments with DOI	Treatments per Page					
Pages per Treatment	Tokens per Treatment (Average)	Tokens per Treatment (Minimum)	Tokens per Treatment (Maximum)						
Number of Treatment Citations	Number of Treatment Citations with HTTP URI	Number of Treatment Citations with DOI							
Number of Materials Citations	Number of Materials Citations with HTTP URI	Materials Citations per Treatment	Number of Figures						
Number of Figures on Zenodo	Number of Figure Citations	Number of Tables	Number of Tables with HTTP URI	Number of Table Citations					
Number of Bibliographic References	Bibliographic References with DOI	Number of Bibliographic Citations	Overall Collecting Countries						

Bibliographic Data						
Verbatim Reference	Authors	Title	Year of Publication	Journal / Publisher	Volume Number	Verbatim Volume Number
	Pagination	URL	DOI	Access Date	Citations in Article	

Treatment Data						
Treatment UUID	Treatment Zenodo Deposition ID	GBIF Taxon ID	Verbatim Taxon Name	Rank of Taxon	Qualification as Taxon	
Taxonomic Kingdom	Taxonomic Phylum	Taxonomic Class	Taxonomic Order	Taxonomic Family	Taxon Genus	Taxon Species
	Taxon Authority	Taxonomic Status				

Materials Data				
Treatment UUID (Materials)	Number of Materials Citations	Total Specimen Count (overall)	Total Specimen Count (males)	
Total Specimen Count (females)	Total Specimen Count (workers)	Total Specimen Count (soldiers)	Total Specimen Count (queens)	
Collecting Countries				

Caption Data (Figures)					
Caption Start ID	Verbatim Caption	Figure DOI	Figure HTTP URI	Zenodo Deposition ID	Citations in Article





# ► Article stats (DIO)

- Filtering values and choosing operations

Fields to Use in Statistics					
Output?	Order? (Desc?)	Field Name	Filter on Values	Operation	Filter on Operation Result
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Article UUID	<input type="text"/>	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Article GBIF Dataset ID	<input type="text"/>	Show Individual Values Count Distinct Values Count All Values Minimum Value Maximum Value	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Zenodo Deposition ID	<input type="text"/>		<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Journal / Publisher	Phytotaxa	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Year of Publication	2020-2021	Show Individual Values ▼	<input type="text"/>

Maximum Rows:





# ► Article stats (DIO)

- Result of queries

Article UUID	Article GBIF Dataset ID
091FFFCBFFC0FF811A7FFFCAFFB7FFD8	cfc7ee81-1d59-48be-9568-08af71afda09
5F2FFFCFFF921009FF971805DA76AF06	
6F324218FF8DFF91FFF3B707FFB05973	
9425FF98FFFEFFDDFFF15F35FFD5F52E	
C926BC4EFFEBFFA64A78FFC4593AE002	e20afa6a-b9b0-40d6-922a-349da64e1a5b
D62EFF84FFE6FFDC9062FFF5FFFEFFDC	5813d31b-2ad4-455c-9999-b731186d048d
FE50FFDCFFACFFF0FFBAAF4BF3748F3E	

Zenodo Deposition ID	Year of Publication	Journal / Publisher
5585883	2020	Phytotaxa
4784553	2020	Phytotaxa
4784518	2020	Phytotaxa
4784526	2020	Phytotaxa
5585921	2020	Phytotaxa
5585894	2020	Phytotaxa
5585916	2020	Phytotaxa





## ➤ Article stats (DIO)

- “Get this statistics in HTML” -> shareable web link
- “Get this statistics in CSV” -> compatible with Excel spreadsheets
- “Get this statistics in XML” -> processable by websites, applications, or software

[Get this Statistics in HTML](#) [Get this Statistics in CSV](#) [Get this Statistics in TSV](#) [Get this Statistics for MS Excel](#) [Get this Statistics in JSON](#) [Get this Statistics in XML](#)





## ► **Article stats (DIO)**

- All articles uploaded to Plazi's server are assigned a TreatmentBank UUID;
- After quality control and gatekeeper liberation, all articles also receive a Zenodo ID;
- If the article presents treatments, it will also receive a GBIF Dataset ID.





# ► Article stats (DIO)

- Paper without treatments

- TB:

This document does not include any treatments. You can use fields above to search.

Copyright notice

- Zenodo (após QC):

August 25, 2020

Journal article

Closed Access

Unravelling the complexity of Mexican biogeographical patterns by naturalists in the 19th century: From Alexander von Humboldt (1769-1859) to Francis Sumichrast (1829-1882)





# ► Treatment stats (SRS)

- Selectable fields may overlap with those in Article Stats
- More focused on treatment-related data, such as taxonomic names and material citations

Taxonomic Data

Verbatim Taxon Name

Rank of Taxon

Qualification as Taxon

Taxonomic Kingdom

Taxonomic Phylum

Taxonomic Class

Taxonomic Order

Taxonomic Family

Taxon Genus

Taxon Species

Verbatim Taxon Authority

Taxon Authority Name

Taxon Authority Year

Basionym Authority Name

Basionym Authority Year

Combination Authority Name

Combination Authority Year

Taxonomic Status

CoL Taxon Name ID

ENA/NCBI Taxon Name ID

Treatment Has Key

Treatment Is Key





# ► Treatment stats (SRS)

Fields to Use in Statistics					
Output?	Order? (Desc?)	Field Name	Filter on Values	Operation	Filter on Operation Result
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Treatment UUID	<input type="text"/>	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Journal / Publisher	<input type="text"/>	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Volume	<input type="text"/>	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Issue	<input type="text"/>	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Year of Publication	<input type="text"/>	Show Individual Values ▼	<input type="text"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> ( )	Verbatim Taxon Name	Handro_nthus%	Show Individual Values ▼	<input type="text"/>

Maximum Rows:

- “%” searches for absence or presence of any character
- “\_” search for any character in the indicated position





# ► Treatment stats (SRS)

- Example: List of different journals that published treatments of *Handroanthus* species (only data processed by Plazi)

Fields to Use in Statistics					
Output?	Order? (Desc?)	Field Name	Filter on Values	Operation	Filter on Operation Result
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Taxon Species		Count Distinct Values ▼	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Taxon Genus	Handroanthus	Count Distinct Values ▼	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Journal / Publisher		Count Distinct Values ▼	
<a href="#">Get Statistics</a> Maximum Rows: <input type="text"/>				▼ Show Individual Values Count Distinct Values Count All Values Minimum Value Maximum Value	
<a href="#">Get this Statistics in HTML</a> <a href="#">Get this Statistics in CSV</a> <a href="#">Get this Statistics in JSON</a> <a href="#">Get this Statistics in XML</a> <a href="#">Get this Statistics for MS Excel</a>					

Number of Treatments	Journal / Publisher	Taxon Genus	Taxon Species
10	2	1	9





# ► Treatment Detail Linking stats (TDL)

- Statistics focused on the Matching Service tool;
- Summary of links generated between specimen occurrences (from scientific collections) and material citations (from scientific articles) in GBIF;
- measurement of researcher's contribution through ORCID;
- Functionalities similar to other TB statistics pages.





# ► Treatment Detail Linking stats (TDL)

Number of Links	Treatment UUID	User ID to Add Link (ORCID, etc.)	Date Link was Added
2	0384CE7C2779FFA2FF025825AD8EFF74	0000-0003-3050-793X	2022-11-08
2	03E5FD39FFF1FFD6C6EEFE8DFDCFFBB3	0000-0003-3050-793X	2022-11-08
2	03C20928FFBFF8D424615893DF20F3C	0000-0003-3050-793X	2022-11-21
2	03C20928FFBFF8D424615893DF20F3C	0000-0003-3050-793X	2022-11-21
2	03C20928FFBFF8D424615893DF20F3C	0000-0003-3050-793X	2022-11-21
2	290714D660D884B92DFCD16728ED54A6	0000-0003-3050-793X	2022-11-21
2	3E5199729F0E2717FDD384FD06FC9C	0000-0003-3050-793X	2022-11-21
2	03C8E66AFFDDFF92FF4EFB7AFC4334D2	0000-0003-3050-793X	2022-11-22

Materials Citation UUID	GBIF Specimen ID	Collecting Country
3B457537277EFA2FE3E59E7AD85FF74	238945476	Bolivia
3B244672FFF1FFD6C6EEFE54FE0AFC93	215565671	
3B03B263FFBDFF8F452B12483D300FD3	1315159462	Namibia
3B03B263FFBDFF8F44C213B93F430EBC	1315159464	Namibia
3B03B263FFBDFF8F409216863F0B0BB9	1315159479	South Africa
B7683F9B3E0678166BA3DEDDF3301886	1315201834	Namibia
069022399F0E2709FF16814EFB6DFB29	1224548530	South Africa
3B095D21FFDDFF92FB5DFA94FBA6347E	466181599	Peru





# ► Uso das estatísticas do TreatmentBank



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<http://zoobank.org/urn:lsid:zoobank.org:pub:C5073571-45B4-46EA-9C0A-89095D633F39>

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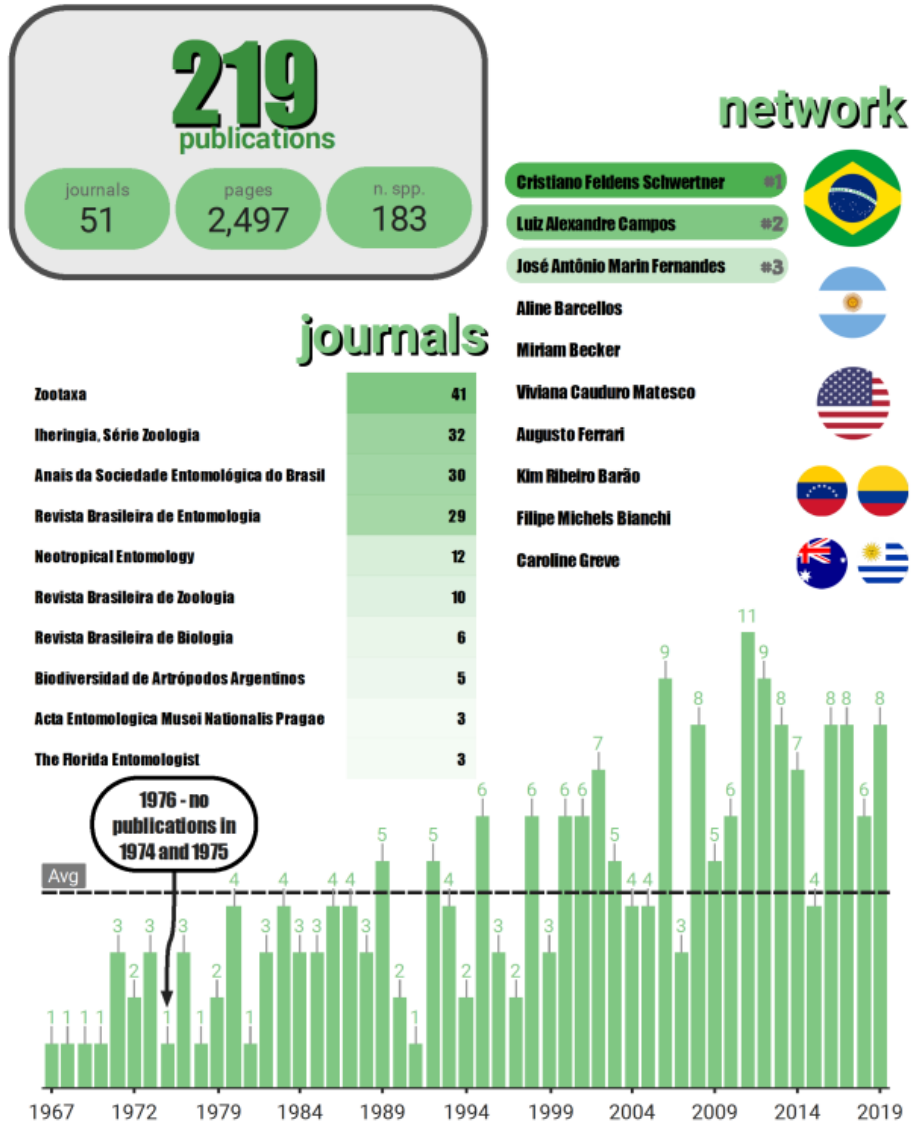
### **Using taxonomic treatments to assess an author's career: the impactful Jocélia Grazia**

MARCUS GUIDOTI<sup>1\*</sup>, FELIPE LORENZ SIMÕES<sup>1,3</sup>, TATIANA PETERSEN RUSCHEL<sup>1,4</sup>,  
VALDENAR DA ROSA GONÇALVES<sup>1,5</sup>, CAROLINA SOKOLOWICZ<sup>1,6</sup> & DONAT AGOSTI<sup>2</sup>





# ► Using TreatmentBank Statistics



## material citation report

### Most recurrent Collectors

Fritz Plaumann

Dirings

Alvarenga

Zikan

D. Link



Number of Materials Citations 1 1,370

## liberated data report

**581 treatments**

# articles  
75

# figures  
544

# tables  
50

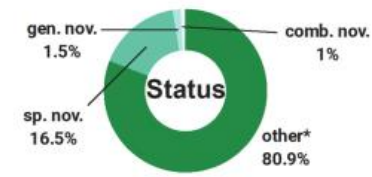
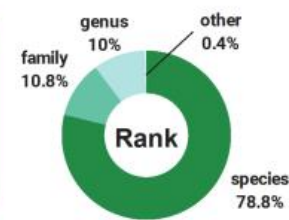
# treatCit  
1,101

# matCit  
2,107

# bibRef  
2,242

## taxonomic overview

total # n. spp.  
**183**  
↓  
liberated  
**96**







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