Versioned Archive and Review of Biotic Interactions and Taxon Names Found within globalbioticinteractions/limbu2025 hash://md5/cdc6545ee343cc33587ef7b51f265da5

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https://github.com/globalbioticinteractions/limbu2025/issues

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Abstract

Life on Earth is sustained by complex interactions between organisms and their environment. These biotic interactions can be captured in datasets and published digitally. We present a review and archiving process for such an openly accessible digital interactions dataset of known origin and discuss its outcome. The dataset under review, named globalbioticinteractions/limbu2025, has fingerprint hash://md5/cdc6545ee343cc33587ef7b51f265da5, is 12.6MiB in size and contains 37,571 interactions with 2 unique types of associations (e.g., coOccursWith) between 281 primary taxa (e.g., Entrophospora lamellosum) and 2,008 associated taxa (e.g., Zea mays). This report includes detailed summaries of interaction data, a taxonomic review from multiple catalogs, and an archived version of the dataset from which the reviews are derived.

Contents

Introduction **2**
Data Review and Archive 2

Methods **2**

Results **4**
Files 4
Archived Dataset 14

Biotic Interactions 14
Interaction Networks 21
Geospatial Distribution 21
Taxonomic Alignment 24
Additional Reviews 27
GloBI Review Badge 28
GloBI Index Badge 28

Discussion **28**

Acknowledgements **29**

Author contributions **29**

References **29**

Introduction

Data Review and Archive

Data review and archiving can be a time-consuming process, especially when done manually. This review report aims to help facilitate both activities. It automates the archiving of datasets, including Darwin Core archives, and is a citable backup of a version of the dataset. Additionally, an automatic review of species interaction claims made in the dataset is generated and registered with Global Biotic Interactions (J. H. Poelen, Simons, and Mungall 2014).

This review includes summary statistics about, and observations about, the dataset under review :

> S. Pehim Limbu, S.L. Stürmer, G. Zahn, C.A. Aguilar-Trigueros, N. Rogers, & V.B. Chaudhary, Climate-linked biogeography of mycorrhizal fungal spore traits, Proc. Natl. Acad. Sci. U.S.A. 122 (29) e2505059122, https://doi.org/10.1073/pnas.2505059122 (2025). https://github.com/globalbioticinteractions/limbu2025/archive/461a5f43a0ceadec056ca19816e9209ea8b3 2026-03-28T03:08:20.405Z hash://md5/cdc6545ee343cc33587ef7b51f265da5

For additional metadata related to this dataset, please visit https://github.com/globalbioticinteractions/limbu2025 and inspect associated metadata files including, but not limited to, *README.md*, *eml.xml*, and/or *globi.json*.

Methods

The review is performed through programmatic scripts that leverage tools like Preston (Elliott et al. 2025), Elton (Kuhn, Poelen, and Leinweber 2025), Nomer (Salim and Poelen 2025), globinizer (J. Poelen, Seltmann, and Mietchen 2024) combined with third-party tools like grep, mlr, tail and head.

Table 1: Tools used in this review process

tool name	version
preston	0.11.1
elton	0.16.7
nomer	0.6.2
globinizer	0.4.0
mlr	6.0.0
jq	1.6
yq	4.25.3
pandoc	3.1.6.1
duckdb	1.3.1
mapserver	7.6.4

The review process can be described in the form of the script below [1].

```
# get versioned copy of the dataset (size approx. 12.6MiB) under review
elton pull globalbioticinteractions/limbu2025

# generate review notes
elton review globalbioticinteractions/limbu2025\
 > review.tsv

# export indexed interaction records
elton interactions globalbioticinteractions/limbu2025\
 > interactions.tsv

# export names and align them with the Catalogue of Life using Nomer
elton names globalbioticinteractions/limbu2025\
 | nomer append col\
 > name-alignment.tsv
```

or visually, in a process diagram.

You can find a copy of the full review script at check-data.sh. See also GitHub and Codeberg.

[1]Note that you have to first get the data (e.g., via elton pull globalbioticinteractions/limbu2025) before being able to generate reviews (e.g., elton review globalbioticinteractions/limbu2025), extract interaction claims (e.g., elton interactions globalbioticinteractions/limbu2025), or list taxonomic names (e.g., elton names globalbioticinteractions/limbu2025)

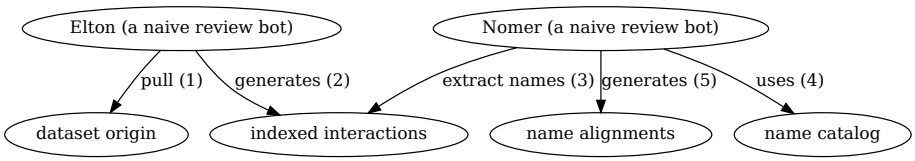

Figure 1: Review Process Overview

Results

In the following sections, the results of the review are summarized [2]. Then, links to the detailed review reports are provided.

Files

The following files are produced in this review:

filename	description
biblio.bib	list of bibliographic reference of this review
check-dataset.sh	data review workflow/process as expressed in a bash script
data.zip	a versioned archive of the data under review
HEAD	the digital signature of the data under review
index.docx	review in MS Word format
index.html	review in HTML format
index.md	review in Pandoc markdown format
index.pdf	review in PDF format
indexed-citations.csv.gz	list of distinct reference citations for reviewed species interaction claims in gzipped comma-separated values file format
indexed-citations.html.gz	list of distinct reference citations for reviewed species interactions claims in gzipped html file format
indexed-citations.tsv.gz	list of distinct reference citations for reviewed species interaction claims in gzipped tab-separated values format

[2]Disclaimer: The results in this review should be considered friendly, yet naive, notes from an unsophisticated robot. Please keep that in mind when considering the review results.

filename	description
indexed-interactions-col-family-col-family.svg	network diagram showing the taxon family to taxon family interaction claims in the dataset under review as interpreted by the Catalogue of Life via Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024)
indexed-interactions-col-kingdom-col-kingdom.svg	network diagram showing the taxon kingdom to taxon kingom interaction claims in the dataset under review as interpreted by the Catalogue of Life via Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024)
indexed-interactions.csv.gz	species interaction claims indexed from the dataset under review in gzipped comma-separated values format
indexed-interactions.html.gz	species interaction claims indexed from the dataset under review in gzipped html format
indexed-interactions.tsv.gz	species interaction claims indexed from the dataset under review in gzipped tab-separated values format
indexed-interactions.parquet	species interaction claims indexed from the dataset under review in Apache Parquet format
indexed-interactions.png	species interaction claims indexed from the dataset under review plotted on a map
indexed-interactions.map	mapserver configuration to plot species interaction claims indexed from the dataset under review on a map
indexed-interactions.gpkg	species interaction claims indexed from the dataset under review in GeoPackage format
indexed-interactions-h3.gpkg	geospatially clustered h3 species interaction claims indexed from the dataset under review in GeoPackage format
indexed-interactions-sample.csv	list of species interaction claims indexed from the dataset under review in gzipped comma-separated values format

filename	description
indexed-interactions-sample.html	first 500 species interaction claims indexed from the dataset under review in html format
indexed-interactions-sample.tsv	first 500 species interaction claims indexed from the dataset under review in tab-separated values format
indexed-names.csv.gz	taxonomic names indexed from the dataset under review in gzipped comma-separated values format
indexed-names.html.gz	taxonomic names found in the dataset under review in gzipped html format
indexed-names.tsv.gz	taxonomic names found in the dataset under review in gzipped tab-separated values format
indexed-names.parquet	taxonomic names found in the dataset under review in Apache Parquet format
indexed-names-resolved-col.csv.gz	taxonomic names found in the dataset under review aligned with the Catalogue of Life as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-col.html.gz	taxonomic names found in the dataset under review aligned with the Catalogue of Life as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-col.tsv.gz	taxonomic names found in the dataset under review aligned with the Catalogue of Life as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-col.parquet	taxonomic names found in the dataset under review aligned with the Catalogue of Life as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format

filename	description
indexed-names-resolved-discoverlife.csv.gz	taxonomic names found in the dataset under review aligned with Discover Life bee species checklist as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-discoverlife.html.gz	taxonomic names found in the dataset under review aligned with Discover Life bee species checklist as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-discoverlife.tsv.gz	taxonomic names found in the dataset under review aligned with Discover Life bee species checklist as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-discoverlife.parquet	taxonomic names found in the dataset under review aligned with Discover Life bee species checklist as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-resolved-gbif.csv.gz	taxonomic names found in the dataset under review aligned with GBIF Backbone Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-gbif.html.gz	taxonomic names found in the dataset under review aligned with GBIF Backbone Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format

filename	description
indexed-names-resolved-gbif.tsv.gz	taxonomic names found in the dataset under review aligned with GBIF Backbone Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-gbif.parquet	taxonomic names found in the dataset under review aligned with GBIF Backbone Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-resolved-itis.csv.gz	taxonomic names found in the dataset under review aligned with Integrated Taxonomic Information System (ITIS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-itis.html.gz	taxonomic names found in the dataset under review aligned with Integrated Taxonomic Information System (ITIS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-itis.tsv.gz	taxonomic names found in the dataset under review aligned with Integrated Taxonomic Information System (ITIS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-itis.parquet	taxonomic names found in the dataset under review aligned with Integrated Taxonomic Information System (ITIS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format

filename	description
indexed-names-resolved-mdd.csv.gz	taxonomic names found in the dataset under review aligned with the Mammal Diversity Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-mdd.html.gz	taxonomic names found in the dataset under review aligned with Mammal Diversity Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-mdd.tsv.gz	taxonomic names found in the dataset under review aligned with Mammal Diversity Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-mdd.parquet	taxonomic names found in the dataset under review aligned with Mammal Diversity Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-resolved-ncbi.csv.gz	taxonomic names found in the dataset under review aligned with the NCBI Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-ncbi.html.gz	taxonomic names found in the dataset under review aligned with the NCBI Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format

filename	description
indexed-names-resolved-ncbi.tsv.gz	taxonomic names found in the dataset under review aligned with the NCBI Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-ncbi.parquet	taxonomic names found in the dataset under review aligned with the NCBI Taxonomy as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-resolved-pbdb.csv.gz	taxonomic names found in the dataset under review aligned with the Paleobiology Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-pbdb.html.gz	taxonomic names found in the dataset under review aligned with Paleobiology Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-pbdb.tsv.gz	taxonomic names found in the dataset under review aligned with Paleobiology Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-pbdb.parquet	taxonomic names found in the dataset under review aligned with Paleobiology Database as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format

filename	description
indexed-names-resolved-tpt.csv.gz	taxonomic names found in the dataset under review aligned with the Terrestrial Parasite Tracker (TPT) Taxonomic Resource as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-tpt.html.gz	taxonomic names found in the dataset under review aligned with the Terrestrial Parasite Tracker (TPT) Taxonomic Resource as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-tpt.tsv.gz	taxonomic names found in the dataset under review aligned with the Terrestrial Parasite Tracker (TPT) Taxonomic Resource as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-tpt.parquet	taxonomic names found in the dataset under review aligned with the Terrestrial Parasite Tracker (TPT) Taxonomic Resource as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-resolved-wfo.csv.gz	taxonomic names found in the dataset under review aligned with the World of Flora Online as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-wfo.html.gz	taxonomic names found in the dataset under review aligned with the World of Flora Online as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format

filename	description
indexed-names-resolved-wfo.tsv.gz	taxonomic names found in the dataset under review aligned with the World of Flora Online as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-wfo.parquet	taxonomic names found in the dataset under review aligned with the World of Flora Online as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-resolved-worms.csv.gz	taxonomic names found in the dataset under review aligned with the World Register of Marine Species (WoRMS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped comma-separated values format
indexed-names-resolved-worms.html.gz	taxonomic names found in the dataset under review aligned with the World Register of Marine Species (WoRMS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped html format
indexed-names-resolved-worms.tsv.gz	taxonomic names found in the dataset under review aligned with the World Register of Marine Species (WoRMS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in gzipped tab-separated values format
indexed-names-resolved-worms.parquet	taxonomic names found in the dataset under review aligned with the World Register of Marine Species (WoRMS) as accessed through the Nomer Corpus of Taxonomic Resources (J. H. (ed.). Poelen 2024) in Apache Parquet format
indexed-names-sample.csv	first 500 taxonomic names found in the dataset under review in comma-separated values format

filename	description
indexed-names-sample.html	first 500 taxonomic names found in the dataset under review in html format
indexed-names-sample.tsv	first 500 taxonomic names found in the dataset under review in tab-separated values format
interaction.svg	diagram summarizing the data model used to index species interaction claims
nanopub-sample.trig	first 500 species interaction claims as expressed in the nanopub format (Kuhn and Dumontier 2014)
nanopub.trig.gz	species interaction claims as expressed in the nanopub format (Kuhn and Dumontier 2014)
process.svg	diagram summarizing the data review processing workflow
prov.nq	origin of the dataset under review as expressed in rdf/nquads
review.csv.gz	review notes associated with the dataset under review in gzipped comma-separated values format
review.html.gz	review notes associated with the dataset under review in gzipped html format
review.tsv.gz	review notes associated with the dataset under review in gzipped tab-separated values format
review-sample.csv	first 500 review notes associated with the dataset under review in comma-separated values format
review-sample.html	first 500 review notes associated with the dataset under review in html format
review-sample.tsv	first 500 review notes associated with the dataset under review in tab-separated values format
review.svg	a review badge generated as part of the dataset review process
zenodo.json	metadata of this review expressed in Zenodo record metadata

Archived Dataset

Note that *data.zip* file in this archive contains the complete, unmodified archived dataset under review.

Biotic Interactions

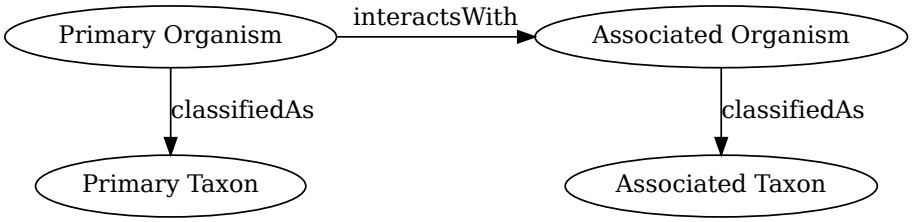

Figure 2: Biotic Interaction Data Model

In this review, biotic interactions (or biotic associations) are modeled as a primary (aka subject, source) organism interacting with an associate (aka object, target) organism. The dataset under review classified the primary/associate organisms with specific taxa. The primary and associate organisms The kind of interaction is documented as an interaction type.

The dataset under review, named globalbioticinteractions/limbu2025, has fingerprint hash://md5/cdc6545ee343cc33587ef7b51f265da5, is 12.6MiB in size and contains 37,571 interactions with 2 unique types of associations (e.g., coOccursWith) between 281 primary taxa (e.g., Entrophospora lamellosum) and 2,008 associated taxa (e.g., Zea mays).

An exhaustive list of indexed interaction claims can be found in gzipped csv, tsv, geopackage and parquet archives. To facilitate discovery, a preview of claims available in the gzipped html page at indexed-interactions.html.gz are shown below.

The exhaustive list was used to create the following data summaries below.

Table 3: Sample of Indexed Interaction Claims

sourceTaxonName	interactionTypeName	targetTaxonName	referenceCitation
Acaulospora alpina	hasHost	Homogyne alpina	S. Pehim Limbu, S.L. Stürmer, G. Zahn, C.A. Aguilar-Trigueros, N. Rogers, & V.B. Chaudhary, Climate-linked biogeography of mycorrhizal fungal spore traits, Proc. Natl. Acad. Sci. U.S.A. 122 (29) e2505059122, https://doi.org/10.1073/pnas.2505059122 (2025). Accessed at https://github.com/globalbioticinteractions/limbu2025/archive/461a5f43a0ceadec056ca19816e9209ea8b317b1.zip on 31 Mar 2026.

sourceTaxonName	interactionTypeName	targetTaxonName	referenceCitation
Acaulospora alpina	hasHost	Capsicum annuum	S. Pehim Limbu, S.L. Stürmer, G. Zahn, C.A. Aguilar-Trigueros, N. Rogers, & V.B. Chaudhary, Climate-linked biogeography of mycorrhizal fungal spore traits, Proc. Natl. Acad. Sci. U.S.A. 122 (29) e2505059122, https://doi.org/10.1073/pnas.2505059122 (2025). Accessed at https://github.com/globalbioticinteractions/limbu2025/archive/461a5f43a0ceadec056ca19816e9209ea8b317b1.zip on 31 Mar 2026.

sourceTaxonName	interactionTypeName	targetTaxonName	referenceCitation
Acaulospora alpina	hasHost	Armeria maritima	S. Pehim Limbu, S.L. Stürmer, G. Zahn, C.A. Aguilar-Trigueros, N. Rogers, & V.B. Chaudhary, Climate-linked biogeography of mycorrhizal fungal spore traits, Proc. Natl. Acad. Sci. U.S.A. 122 (29) e2505059122, https://doi.org/10.1073/pnas.2505059122 (2025). Accessed at https://github.com/globalbioticinteractions/limbu2025/archive/461a5f43a0ceadec056ca19816e9209ea8b317b1.zip on 31 Mar 2026.

sourceTaxonName	interactionTypeName	targetTaxonName	referenceCitation
Acaulospora alpina	hasHost	Baccharis magellanica	S. Pehim Limbu, S.L. Stürmer, G. Zahn, C.A. Aguilar-Trigueros, N. Rogers, & V.B. Chaudhary, Climate-linked biogeography of mycorrhizal fungal spore traits, Proc. Natl. Acad. Sci. U.S.A. 122 (29) e2505059122, https://doi.org/10.1073/pnas.2505059122 (2025). Accessed at https://github.com/globalbioticinteractions/limbu2025/archive/461a5f43a0ceadec056ca19816e9209ea8b317b1.zip on 31 Mar 2026.

Table 4: Most Frequently Mentioned Interaction Types (up to 20 most frequent)

interactionTypeName	count
coOccursWith	19436
hasHost	18135

Table 5: Most Frequently Mentioned Primary Taxa (up to 20 most frequent)

sourceTaxonName	count
Entrophospora lamellosum	4302
Rhizophagus intraradices	2557
Funneliformis mosseae	1804

sourceTaxonName	count
Diversispora epigaea	1125
Archaeospora trappei	1106
Paraglomus laccatum	1033
Gigaspora decipiens	944
Funneliformis caledonium	916
Septoglomus viscosum	867
Entrophospora etunicatum	737
Entrophospora claroideum	682
Septoglomus constrictum	674
Rhizophagus irregularis	643
Funneliformis geosporus	641
Rhizophagus fasciculatus	634
Paraglomus brasilianum	628
Paraglomus occultum	623
Racocetra castanea	609
Acaulospora scrobiculata	591

Table 6: Most Frequently Mentioned Associate Taxa (up to 20 most frequent)

targetTaxonName	count
Zea mays	1459
Plantago lanceolata	1415
Triticum aestivum	1278
Festuca rubra	1035
Helictotrichon pubescens	1001
Arrhenatherum elatius	505
Vitis vinifera	430
Daucus carota	422
soybean	410
Coffea arabica	383
Eragostis tef	381
Theobroma cacao	374
Mangifera indica	349
corn	346
Pinus contorta	312
Solanum tuberosum	244
Achillea millefolium	240
Litchi chinensis	235
Mimosa tenuiflora	225

Table 7: Most Frequent Interactions between Primary and Associate Taxa (up to 20 most frequent)

sourceTaxonName	interactionTypeName	targetTaxonName	count
Entrophospora lamellosum	coOccursWith	Plantago lanceolata	409
Entrophospora lamellosum	coOccursWith	Pinus contorta	302
Paraglomus laccatum	coOccursWith	Plantago lanceolata	264
Entrophospora lamellosum	coOccursWith	Festuca rubra	255
Entrophospora lamellosum	coOccursWith	Helictotrichon pubescens	254
Archaeospora trappei	coOccursWith	Plantago lanceolata	220
Diversispora epigaea	coOccursWith	Plantago lanceolata	213
Paraglomus laccatum	coOccursWith	Festuca rubra	192
Paraglomus laccatum	coOccursWith	Helictotrichon pubescens	192
Diversispora epigaea	coOccursWith	Festuca rubra	189
Diversispora epigaea	coOccursWith	Helictotrichon pubescens	189
Entrophospora lamellosum	coOccursWith	Triticum aestivum	185
Archaeospora trappei	coOccursWith	Festuca rubra	183
Archaeospora trappei	coOccursWith	Helictotrichon pubescens	183
Funneliformis caledonium	coOccursWith	Triticum aestivum	165
Rhizophagus intraradices	coOccursWith	Plantago lanceolata	144
Funneliformis mosseae	coOccursWith	Zea mays	134
Rhizophagus intraradices	coOccursWith	Triticum aestivum	123
Entrophospora lamellosum	coOccursWith	Zea mays	114

Interaction Networks

The figures below provide a graph view on the dataset under review. The first shows a summary network on the kingdom level, and the second shows how interactions on the family level. It is important to note that both network graphs were first aligned taxonomically using the Catalogue of Life. Please refer to the original (or verbatim) taxonomic names for a more original view on the interaction data.

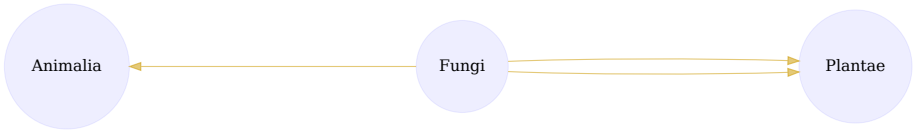

Figure 3: Interactions on taxonomic kingdom rank as interpreted by the Catalogue of Life download svg

You can download the indexed dataset under review at indexed-interactions.csv.gz. A tab-separated file can be found at indexed-interactions.tsv.gz

Geospatial Distribution

If geospatial information was extracted from the dataset under review, the map below will show their distribution. These maps were generated using MapServer (McKenna et al. 2025) tools configured via map configuration indexed-interactions.map :

```
MAP
  SIZE 1600 800
  EXTENT -180 -90 180 90
  PROJECTION
    "init=epsg:4326"
  END
  LAYER # MODIS WMS map from NASA
    NAME         "modis_nasa"
    TYPE         RASTER
    OFFSITE      0 0 0
    STATUS       ON
    CONNECTIONTYPE WMS
    CONNECTION "https://gibs.earthdata.nasa.gov/wms/epsg4326/best/wms.cgi?"

    METADATA
      "wms_srs" "EPSG:4326"
      "wms_name" "OSM_Land_Water_Map"
      "wms_server_version" "1.1.1"
      "wms_format" "image/jpeg"
    END
```

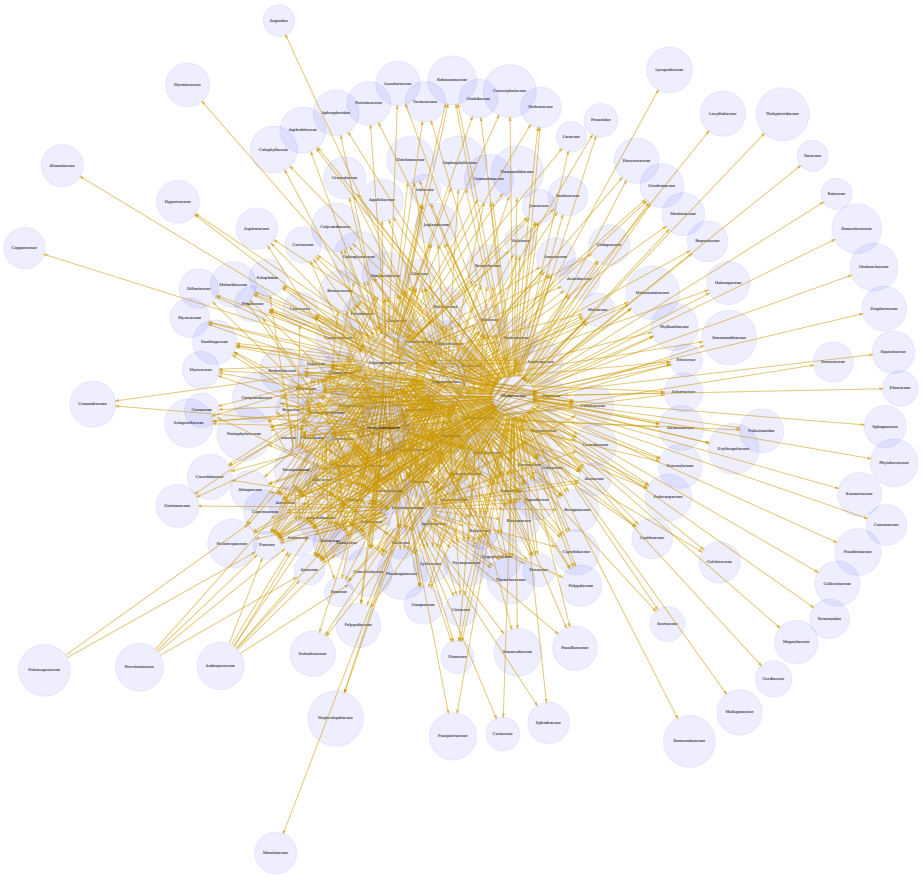

Figure 4: Interactions on the taxonomic family rank as interpreted by the Catalogue of Life. download svg

```
    CLASS
      STYLE
        COLOR        232 232 232
        OUTLINECOLOR 32 32 32
      END
    END
  END
  LAYER
    NAME "indexed-interactions"
    TYPE POLYGON
    STATUS ON
    CONNECTIONTYPE OGR
    CONNECTION "indexed-interactions-h3.gpkg"
    DATA "indexed-interactions-h3"
    CLASS
      STYLE
        COLORRANGE 253.0 231.0 37.0 32.0 164.0 134.0
        DATARANGE 0.3010299956639812 3.490660653356137
        RANGEITEM "log_number_of_records"
        OUTLINECOLOR 0 0 0
      END
    END
  END
END
```

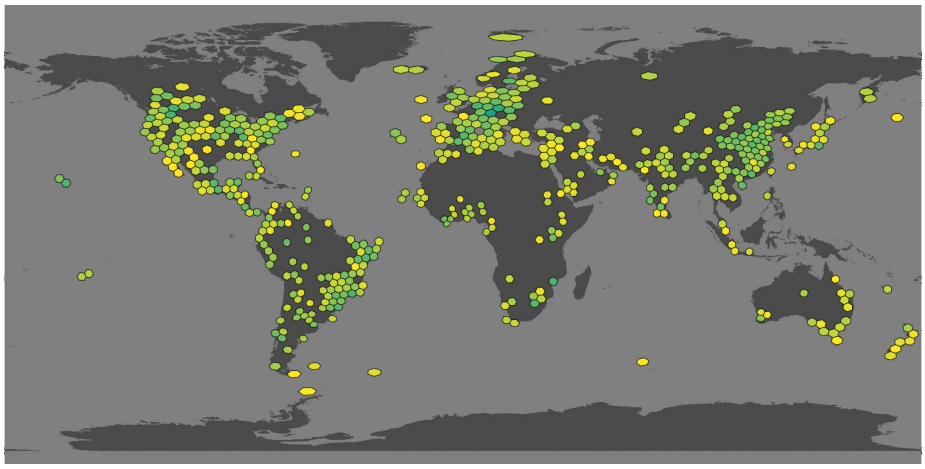

Figure 5: Hexagonal grid cells indicate that interactions claims are available for selected geospatial area: light yellow means relatively fewer claims, dark green relatively more claims.

Associated data can be found in the geopackage files at indexed-interactions

.gpkg for point data and indexed-interactions-h3.gpkg for data clustered in geospatial h3 hexagonals.

Learn more about the structure of this download at GloBI website, by opening a GitHub issue, or by sending an email.

Another way to discover the dataset under review is by searching for it on the GloBI website.

Taxonomic Alignment

As part of the review, all names are aligned against various name catalogs (e.g., col, ncbi, discoverlife, gbif, itis, wfo, mdd, tpt, pbdb, and worms). These alignments can help review name usage or aid in selecting of a suitable taxonomic name resource.

Table 8: Sample of Name Alignments

providedName	relationName	resolvedCatalogName	resolvedName
Belonging families	NONE	col	Belonging families
Abelmoschus esculentus	HAS_ACCEPTED_NAME	col	Abelmoschus esculentus
Abies alba	HAS_ACCEPTED_NAME	col	Abies alba
Abies amabilis	HAS_ACCEPTED_NAME	col	Abies amabilis

Table 9: Distribution of Taxonomic Ranks of Aligned Names by Catalog. Names that were not aligned with a catalog are counted as NAs. So, the total number of unaligned names for a catalog will be listed in their NA row.

resolvedCatalogName	resolvedRank	count
col	NA	468
col	family	4
col	genus	184
col	order	1
col	section	1
col	species	1514
col	subgenus	1
col	suborder	1
col	subspecies	57
col	variety	24
discoverlife	NA	2209
gbif	NA	448
gbif	family	7

resolvedCatalogName	resolvedRank	count
gbif	genus	187
gbif	species	1525
gbif	subspecies	75
gbif	variety	32
itis	NA	1118
itis	family	6
itis	genus	169
itis	order	1
itis	species	891
itis	suborder	1
itis	subspecies	9
itis	variety	20
mdd	NA	2209
ncbi	NA	618
ncbi	clade	1
ncbi	family	4
ncbi	genus	173
ncbi	species	1394
ncbi	subfamily	1
ncbi	subgenus	2
ncbi	subspecies	10
ncbi	varietas	6
pbdb	NA	2062
pbdb	family	6
pbdb	genus	97
pbdb	order	1
pbdb	species	40
pbdb	subfamily	1
pbdb	suborder	1
pbdb	subtribe	1
pbdb	tribe	1
pbdb	unranked clade	1
tpt	NA	2206
tpt	genus	2
tpt	species	1
wfo	NA	729
wfo	family	6
wfo	genus	178
wfo	species	1275
wfo	subspecies	26
wfo	variety	15
worms	NA	1745
worms	family	4
worms	genus	121

resolvedCatalogName	resolvedRank	count
worms	order	1
worms	species	336
worms	suborder	1
worms	subspecies	3
worms	variety	4

Table 10: Name relationship types per catalog. Name relationship type "NONE" means that a name was not recognized by the associated catalog. "SAME_AS" indicates either a "HAS_ACCEPTED_NAME" or "SYNONYM_OF" name relationship type. We recognize that "SYNONYM_OF" encompasses many types of nomenclatural synonymies (ICZN 1999) (e.g., junior synonym, senior synonyms).

resolvedCatalogName	relationName	count
col	NONE	495
col	HAS_ACCEPTED_NAME	1543
col	SYNONYM_OF	609
discoverlife	NONE	2289
gbif	NONE	474
gbif	HAS_ACCEPTED_NAME	1973
gbif	SYNONYM_OF	1043
itis	NONE	1147
itis	HAS_ACCEPTED_NAME	974
itis	SYNONYM_OF	244
mdd	NONE	2289
ncbi	NONE	645
ncbi	SAME_AS	1452
ncbi	SYNONYM_OF	202
ncbi	COMMON_NAME_OF	2
pbdb	NONE	2120
pbdb	HAS_ACCEPTED_NAME	173
pbdb	SYNONYM_OF	5
tpt	NONE	2286
tpt	HAS_ACCEPTED_NAME	3
wfo	NONE	758
wfo	HAS_ACCEPTED_NAME	1330
wfo	SYNONYM_OF	376
wfo	HAS_UNCHECKED_NAME	135
worms	NONE	1791
worms	HAS_ACCEPTED_NAME	509
worms	SYNONYM_OF	103

Table 11: List of Available Name Alignment Reports

catalog name	alignment results
col	associated names alignments report in gzipped html, csv, and tsv)
ncbi	associated names alignments report in gzipped html, csv, and tsv)
discoverlife	associated names alignments report in gzipped html, csv, and tsv)
gbif	associated names alignments report in gzipped html, csv, and tsv)
itis	associated names alignments report in gzipped html, csv, and tsv)
wfo	associated names alignments report in gzipped html, csv, and tsv)
mdd	associated names alignments report in gzipped html, csv, and tsv)
tpt	associated names alignments report in gzipped html, csv, and tsv)
pbdb	associated names alignments report in gzipped html, csv, and tsv)
worms	associated names alignments report in gzipped html, csv, and tsv)

Additional Reviews

Elton, Nomer, and other tools may have difficulties interpreting existing species interaction datasets. Or, they may misbehave, or otherwise show unexpected behavior. As part of the review process, detailed review notes are kept that document possibly misbehaving, or confused, review bots. An sample of review notes associated with this review can be found below.

Table 12: First few lines in the review notes.

reviewDate	reviewCommentType	reviewComment
2026-03-30T23:41:35Z	note	target taxon name missing
2026-03-30T23:41:35Z	note	target taxon name missing
2026-03-30T23:41:35Z	note	target taxon name missing
2026-03-30T23:41:35Z	note	target taxon name missing

In addition, you can find the most frequently occurring notes in the table below.

Table 13: Most frequently occurring review notes, if any.

reviewComment	count
target taxon name missing	49502

For additional information on review notes, please have a look at the first 500 Review Notes in html format or the download full gzipped csv or tsv archives.

GloBI Review Badge

As part of the review, a review badge is generated. This review badge can be included in webpages to indicate the review status of the dataset under review.

Figure 6: Picture of a GloBI Review Badge [3]

Note that if the badge is green, no review notes were generated. If the badge is yellow, the review bots may need some help with interpreting the species interaction data.

GloBI Index Badge

If the dataset under review has been registered with GloBI, and has been succesfully indexed by GloBI, the GloBI Index Status Badge will turn green. This means that the dataset under review was indexed by GloBI and is available through GloBI services and derived data products.

Figure 7: Picture of a GloBI Index Badge [4]

If you'd like to keep track of reviews or index status of the dataset under review, please visit GloBI's dataset index [5] for badge examples.

Discussion

This review and archive provides a means of creating citable versions of datasets that change frequently. This may be useful for dataset managers, including

[3] Up-to-date status of the GloBI Review Badge can be retrieved from the GloBI Review Depot

[4] Up-to-date status of the GloBI Index Badge can be retrieved from GloBI's API

[5] At time of writing (2026-03-31) the version of the GloBI dataset index was available at https://globalbioticinteractions.org/datasets

natural history collection data managers, as a backup archive of a shared Darwin Core archive. It also serves as a means of creating a trackable citation for the dataset in an automated way, while also including some information about the contents of the dataset.

This review aims to provide a perspective on the dataset to aid in understanding of species interaction claims discovered. However, it is important to note that this review does *not* assess the quality of the dataset. Instead, it serves as an indication of the open-ness[6] and FAIRness (Wilkinson et al. 2016; Trekels et al. 2023) of the dataset: to perform this review, the data was likely openly available, **F**indable, **A**ccessible, **I**nteroperable and **R**eusable. The current Open-FAIR assessment is qualitative, and a more quantitative approach can be implemented with specified measurement units.

This report also showcases the reuse of machine-actionable (meta)data, something highly recommended by the FAIR Data Principles (Wilkinson et al. 2016). Making (meta)data machine-actionable enables more precise procesing by computers, enabling even naive review bots like Nomer and Elton to interpret the data effectively. This capability is crucial for not just automating the generation of reports, but also for facilitating seamless data exchanges, promoting interoperability.

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Author contributions

Nomer was responsible for name alignments. Elton carried out dataset extraction, and generated the review notes. Preston tracked, versioned, and packaged, the dataset under review.

References

Elliott, Michael, Jorrit Poelen, Icaro Alzuru, Emilio Berti, and partha04patel. 2025. "Bio-Guoda/Preston: 0.10.5." Zenodo. https://doi.org/10.5281/zenodo.14662206.

[6]According to http://opendefinition.org/: "Open data is data that can be freely used, reused and redistributed by anyone - subject only, at most, to the requirement to attribute and sharealike."

ICZN. 1999. "International Code of Zoological Nomenclature." The International Trust for Zoological Nomenclature, London, UK. https://www.iczn.org/the-code/the-code-online/.

Kuhn, Tobias, and Michel Dumontier. 2014. "Trusty URIs: Verifiable, Immutable, and Permanent Digital Artifacts for Linked Data." In *The Semantic Web: Trends and Challenges*, edited by Valentina Presutti, Claudia d'Amato, Fabien Gandon, Mathieu d'Aquin, Steffen Staab, and Anna Tordai, 395–410. Cham: Springer International Publishing.

Kuhn, Tobias, Jorrit Poelen, and Katrin Leinweber. 2025. "Globalbioticinteractions/Elton: 0.15.1." Zenodo. https://doi.org/10.5281/zenodo.14927734.

McKenna, Jeff, Steve Lime, Thomas Bonfort, Jérome Boué, Howard Butler, Seth Girvin, Tom Kralidis, et al. 2025. "MapServer." Zenodo. https://doi.org/10.5281/zenodo.17807263.

Poelen, Jorrit H. (ed.). 2024. "Nomer Corpus of Taxonomic Resources Hash://Sha256/ B60c0d25a16ae77b24305782017b1a270b79b5d1746f832650F2027ba536e276 Hash://Md5/17f1363a277ee0e4ecaf1b91c665e47e." Zenodo. https://doi.org/10.5281/zenodo.12695629.

Poelen, Jorrit H., James D. Simons, and Chris J. Mungall. 2014. "Global Biotic Interactions: An Open Infrastructure to Share and Analyze Species-Interaction Datasets." *Ecological Informatics* 24 (November): 148–59. https://doi.org/10.1016/j.ecoinf.2014.08.005.

Poelen, Jorrit, Katja Seltmann, and Daniel Mietchen. 2024. "Globalbioticinteractions/Globinizer: 0.4.0." Zenodo. https://doi.org/10.5281/zenodo.10647565.

Salim, José Augusto, and Jorrit Poelen. 2025. "Globalbioticinteractions/Nomer: 0.5.15." Zenodo. https://doi.org/10.5281/zenodo.14893840.

Trekels, Maarten, Debora Pignatari Drucker, José Augusto Salim, Jeff Ollerton, Jorrit Poelen, Filipi Miranda Soares, Max Rünzel, Muo Kasina, Quentin Groom, and Mariano Devoto. 2023. "WorldFAIR Project (D10.1) Agriculture-related pollinator data standards use cases report." Zenodo. https://doi.org/10.5281/zenodo.8176978.

Wilkinson, Mark D., Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, et al. 2016. "The FAIR Guiding Principles for Scientific Data Management and Stewardship." *Scientific Data* 3 (1). https://doi.org/10.1038/sdata.2016.18.