

Versioned Archive and Review of Biotic  
Interactions and Taxon Names Found within  
globalbioticinteractions/usda-fungus-host  
hash://md5/5836bbb61671a634a8bb614d645a96f9

by Nomer, Elton and Preston, three naive review bots  
review@globalbioticinteractions.org  
<https://globalbioticinteractions.org/contribute>  
<https://github.com/globalbioticinteractions/usda-fungus-host/issues>

2026-03-30

**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/usda-fungus-host, has fingerprint hash://md5/5836bbb61671a634a8bb614d645a96f9, is 205MiB in size and contains 826,329 interactions with 1 unique type of association (e.g., hasHost) between 98,724 primary taxa (e.g., *Oidium* sp.) and 64,962 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 This report includes detailed summaries of interaction data, a taxonomic review from multiple catalogs, and an archived version of the dataset from which the reviews are derived.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**

<b>Introduction</b>	<b>2</b>
Data Review and Archive . . . . .	2
<b>Methods</b>	<b>2</b>
<b>Results</b>	<b>4</b>
Files . . . . .	4
Archived Dataset . . . . .	14
Biotic Interactions . . . . .	14

Interaction Networks . . . . .	17
Geospatial Distribution . . . . .	18
Taxonomic Alignment . . . . .	21
Additional Reviews . . . . .	26
GloBI Review Badge . . . . .	26
GloBI Index Badge . . . . .	27
<b>Discussion</b>	<b>27</b>
<b>Acknowledgements</b>	<b>28</b>
<b>Author contributions</b>	<b>28</b>
<b>References</b>	<b>28</b>

## 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 :

Farr, David F.; Rossman, Amy Y.; Castlebury, Lisa A. (2021). United States National Fungus Collections Fungus-Host Dataset. Ag Data Commons. <https://doi.org/10.15482/USDA.ADC/1524414>. <https://github.com/globalbioticinteractions/usda-fungus-host/archive/47a3882c0c5365d3e6065e1cf7f3b32026-03-28T06:18:26.912Z> hash://md5/5836bbb61671a634a8bb614d645a96f9

For additional metadata related to this dataset, please visit <https://github.com/globalbioticinteractions/usda-fungus-host> 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 <sup>1</sup>.

```
# get versioned copy of the dataset (size approx. 205MiB) under review
elton pull globalbioticinteractions/usda-fungus-host

# generate review notes
elton review globalbioticinteractions/usda-fungus-host\
> review.tsv

# export indexed interaction records
elton interactions globalbioticinteractions/usda-fungus-host\
> interactions.tsv

# export names and align them with the Catalogue of Life using Nomer
elton names globalbioticinteractions/usda-fungus-host\
| 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](#).

---

<sup>1</sup>Note that you have to first get the data (e.g., via `elton pull globalbioticinteractions/usda-fungus-host`) before being able to generate reviews (e.g., `elton review globalbioticinteractions/usda-fungus-host`), extract interaction claims (e.g., `elton interactions globalbioticinteractions/usda-fungus-host`), or list taxonomic names (e.g., `elton names globalbioticinteractions/usda-fungus-host`)

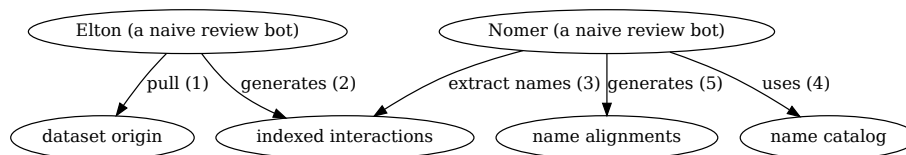


Figure 1: Review Process Overview

## Results

In the following sections, the results of the review are summarized <sup>2</sup>. 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

<sup>2</sup>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 kingdom 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

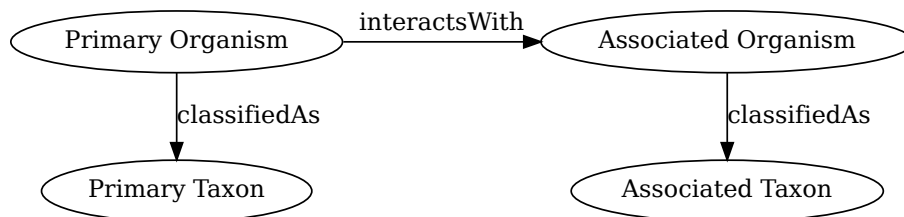


Figure 2: Biotic Interaction Data Model

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/usda-fungus-host`, has fingerprint hash://md5/5836bbb61671a634a8bb614d645a96f9, is 205MiB in size and contains 826,329 interactions with 1 unique type of association (e.g., `hasHost`) between 98,724 primary taxa (e.g., *Oidium* sp.) and 64,962 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
<i>Mycosphaerella pachyasca</i>	<code>hasHost</code>	<i>Plantago major</i>	Anonymous. 1960. Index of Plant Diseases in the United States. U.S.D.A. Agric. Handb. 165:1-531

sourceTaxonName	interactionType	targetTaxonName	referenceCitation
Mycosphaerella pachyasca	hasHost	Plantago major	Anonymous. 1960. Index of Plant Diseases in the United States. U.S.D.A. Agric. Handb. 165:1-531
Mycosphaerella pachyasca	hasHost	Plantago major	Farr, David F.; Rossman, Amy Y.; Castlebury, Lisa A. (2021). United States National Fungus Collections Fungus-Host Dataset. Ag Data Commons. <a href="https://doi.org/10.15482/USDA.ADC/1524414">https://doi.org/10.15482/USDA.ADC/1524414</a> . Accessed at <a href="https://github.com/globalbiotici nteractions/usda-fungus-host/archive/47a3882c0c5365d3e6065e1cf7f3b36945f06fa9.zip">https://github.com/globalbiotici nteractions/usda-fungus-host/archive/47a3882c0c5365d3e6065e1cf7f3b36945f06fa9.zip</a> on 30 Mar 2026.
Puccinia farinacea	hasHost	Salvia farinacea	Baxter, J.W., and Cummins, G.B.. 1951. A monograph of species of %Puccinia% occurring on %Salvia% in North America. Lloydia 14:201-230

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

interactionTypeName	count
hasHost	826329

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

sourceTaxonName	count
Oidium sp.	6241
Erysiphe cichoracearum	4287
Rhizoctonia solani	3655
Botrytis cinerea	3407
Leveillula taurica	3045
Fusarium sp.	2934
Puccinia graminis	2630
Colletotrichum gloeosporioides	2518
Sphaerotheca fuliginea	2452
Claviceps purpurea	2323
Alternaria sp.	2114
Armillaria mellea	2108
Cercospora sp.	2098
Glomerella cingulata	2074
Erysiphe polygoni	2071
Sclerotinia sclerotiorum	2047
Sclerotium rolfsii	1965
Erysiphe graminis	1880
Fusarium oxysporum	1873

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

targetTaxonName	count
Zea mays	6426
Vitis vinifera	4855
Quercus sp.	4682
Triticum aestivum	4030
Salix sp.	2717
Oryza sativa	2689
Glycine max	2677

targetTaxonName	count
Eucalyptus sp.	2634
Phaseolus vulgaris	2580
Vitis sp.	2563
Hordeum vulgare	2558
Solanum tuberosum	2459
Lycopersicon esculentum	2457
Pinus sp.	2331
Saccharum officinarum	2331
Pinus sylvestris	2268
Populus sp.	2256
Mangifera indica	2243
Medicago sativa	2066

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

sourceTaxonName	interactionTypeName	targetTaxonName	count
Puccinia sorghi	hasHost	Zea mays	233
Plasmopara viticola	hasHost	Vitis vinifera	230
Alternaria solani	hasHost	Solanum tuberosum	228
Tilletia caries	hasHost	Triticum aestivum	223
Phytophthora infestans	hasHost	Solanum tuberosum	216
Ustilago maydis	hasHost	Zea mays	214
Tilletia foetida	hasHost	Triticum aestivum	196
Ustilago nuda	hasHost	Hordeum vulgare	193
Puccinia cynodontis	hasHost	Cynodon dactylon	189
Ustilago cynodontis	hasHost	Cynodon dactylon	189
Cercospora beticola	hasHost	Beta vulgaris	184
Uromyces striatus	hasHost	Medicago sativa	180
Sphacelotheca sorghi	hasHost	Sorghum vulgare	161
Ustilago hordei	hasHost	Hordeum vulgare	156
Uromyces appendiculatus	hasHost	Phaseolus vulgaris	156
Cercospora ricinella	hasHost	Ricinus communis	146
Peronospora arborescens	hasHost	Papaver somniferum	145
Ustilago tritici	hasHost	Triticum aestivum	137
Puccinia helianthi	hasHost	Helianthus annuus	134

### 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.

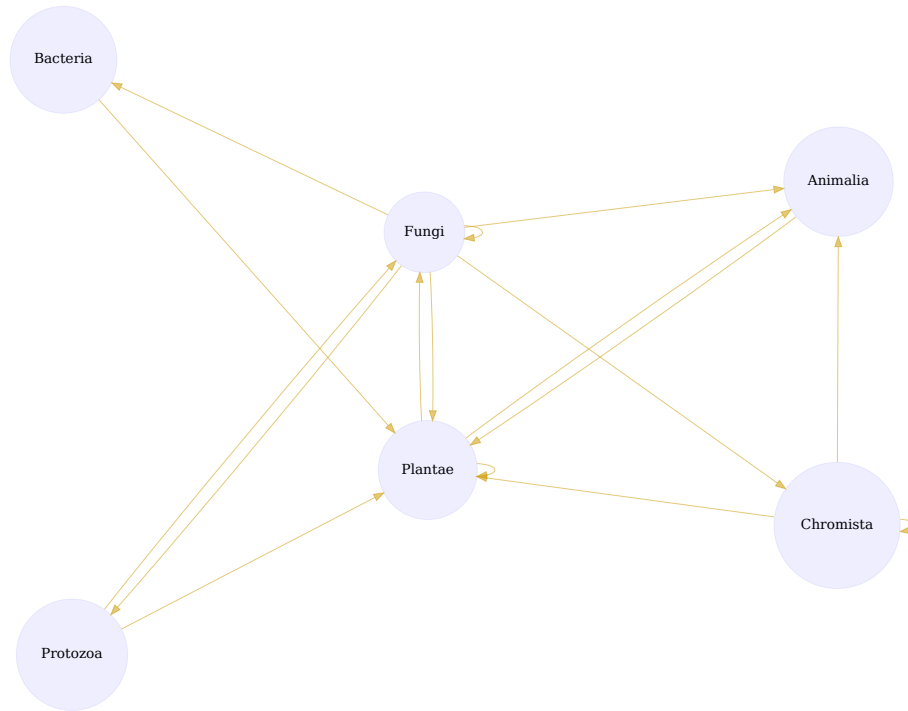


Figure 3: Interactions on taxonomic kingdom rank as interpreted by the Catalogue of Life download svg

You can download the indexed dataset under review at [indexed-interactions.csv.gz](http://indexed-interactions.csv.gz). A tab-separated file can be found at [indexed-interactions.tsv.gz](http://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

```

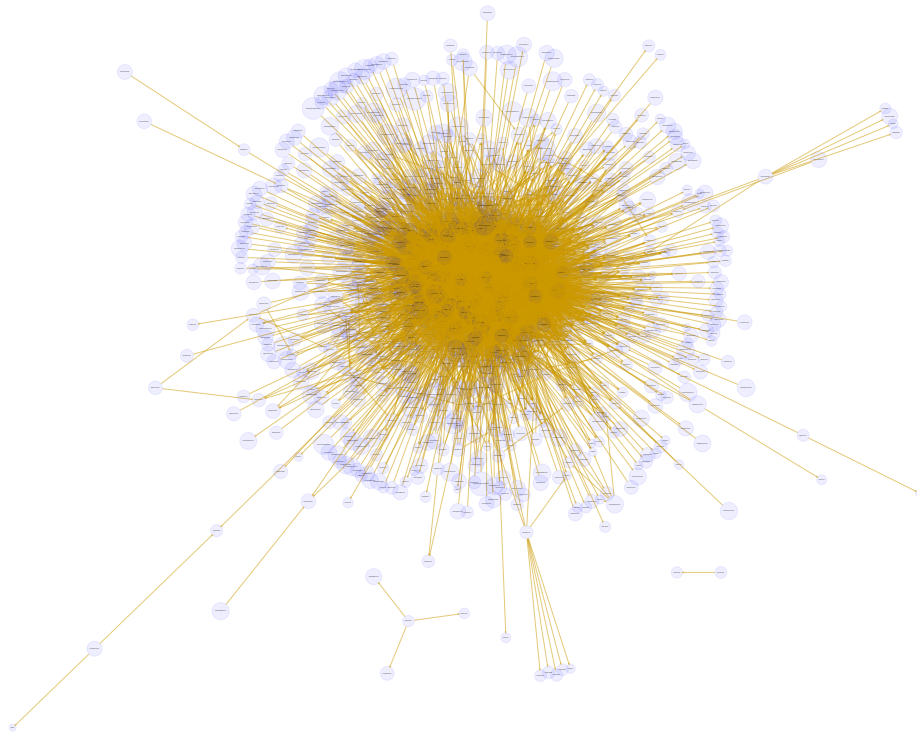


Figure 4: Interactions on the taxonomic family rank as interpreted by the Catalogue of Life. [download svg](#)

```

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
  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 NULL NULL
      RANGEITEM "log_number_of_records"
      OUTLINECOLOR 0 0 0
    END
  END
END
END

```

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

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, pldb, 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
Aaosphaeria arxii	HAS_ACCEPTED_NAME	col	Aaosphaeria arxii
Abacopteris urophylla	SYNONYM_OF	col	Abacopteris repanda
Abarema bigemina	SYNONYM_OF	col	Archidendron bigeminum
Abarema grandiflora	SYNONYM_OF	col	Archidendron grandiflorum

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	36849
col	class	3
col	family	100
col	form	15
col	genus	5405
col	kingdom	2
col	order	8
col	other	1
col	phylum	1
col	section	2
col	species	115787
col	subclass	1
col	subfamily	8
col	subgenus	26

resolvedCatalogName	resolvedRank	count
col	suborder	1
col	subspecies	3879
col	subterclass	1
col	subtribe	1
col	superorder	2
col	variety	1520
discoverlife	NA	161855
discoverlife	species	10
gbif	NA	26087
gbif	class	4
gbif	family	108
gbif	form	98
gbif	genus	5595
gbif	kingdom	3
gbif	order	7
gbif	phylum	2
gbif	species	125363
gbif	subspecies	5169
gbif	variety	2706
itis	NA	139030
itis	class	2
itis	division	1
itis	family	109
itis	form	1
itis	genus	2797
itis	kingdom	2
itis	order	9
itis	phylum	1
itis	species	18333
itis	subclass	2
itis	subgenus	4
itis	suborder	1
itis	subspecies	796
itis	subtribe	1
itis	superorder	1
itis	variety	869
mdd	NA	161864
ncbi	NA	102608
ncbi	clade	3
ncbi	class	3
ncbi	family	94
ncbi	forma	14
ncbi	forma specialis	6
ncbi	genus	4726

resolvedCatalogName	resolvedRank	count
ncbi	infraorder	1
ncbi	kingdom	1
ncbi	order	9
ncbi	phylum	2
ncbi	section	4
ncbi	species	53671
ncbi	subclass	1
ncbi	subfamily	5
ncbi	subgenus	19
ncbi	subspecies	391
ncbi	subtribe	1
ncbi	superorder	2
ncbi	tribe	1
ncbi	varietas	318
pbdb	NA	160148
pbdb	class	4
pbdb	family	90
pbdb	genus	1176
pbdb	informal	1
pbdb	kingdom	3
pbdb	order	10
pbdb	phylum	2
pbdb	species	425
pbdb	subclass	1
pbdb	subfamily	3
pbdb	suborder	4
pbdb	superorder	1
pbdb	tribe	2
pbdb	unranked clade	6
tpt	NA	161824
tpt	family	1
tpt	genus	22
tpt	order	1
tpt	species	15
tpt	specificepithet	1
tpt	subspecificepithet	1
wfo	NA	110257
wfo	family	83
wfo	form	16
wfo	genus	3378
wfo	section	7
wfo	series	1
wfo	species	45703
wfo	subgenus	2

resolvedCatalogName	resolvedRank	count
wfo	subsection	1
wfo	subspecies	2118
wfo	tribe	1
wfo	variety	1224
worms	NA	150694
worms	class	3
worms	family	85
worms	genus	1905
worms	kingdom	2
worms	order	9
worms	phylum	1
worms	phylum (division)	2
worms	species	8790
worms	subclass	1
worms	subgenus	1
worms	suborder	1
worms	subspecies	421
worms	subterclass	1
worms	superorder	2
worms	tribe	1
worms	variety	249

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	HAS_ACCEPTED_NAME	81314
col	SYNONYM_OF	56577
col	NONE	37104
discoverlife	NONE	162639
discoverlife	HAS_ACCEPTED_NAME	5
discoverlife	SYNONYM_OF	7
gbif	HAS_ACCEPTED_NAME	97112
gbif	SYNONYM_OF	80919
gbif	NONE	26272
itis	NONE	139405
itis	HAS_ACCEPTED_NAME	16054

resolvedCatalogName	relationName	count
itis	SYNONYM_OF	8309
mdd	NONE	162635
mdd	HAS_ACCEPTED_NAME	6
ncbi	SAME_AS	47751
ncbi	NONE	102871
ncbi	SYNONYM_OF	12379
ncbi	COMMON_NAME_OF	2
pbdb	NONE	160707
pbdb	HAS_ACCEPTED_NAME	1936
pbdb	SYNONYM_OF	142
tpt	NONE	162599
tpt	HAS_ACCEPTED_NAME	46
tpt	SYNONYM_OF	9
wfo	NONE	110588
wfo	SYNONYM_OF	25921
wfo	HAS_UNCHECKED_NAME	4799
wfo	HAS_ACCEPTED_NAME	32166
worms	NONE	151205
worms	HAS_ACCEPTED_NAME	10048
worms	SYNONYM_OF	4901

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)

catalog name	alignment results
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
2026-03-30T18:29:50Z	note	target taxon name missing
2026-03-30T18:29:50Z	note	target taxon name missing
2026-03-30T18:29:50Z	note	target taxon name missing
2026-03-30T18:29:50Z	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	1316

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 <sup>3</sup>

<sup>3</sup>Up-to-date status of the GloBI Review Badge can be retrieved from the GloBI Review Depot

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 successfully 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 <sup>4</sup>

If you'd like to keep track of reviews or index status of the dataset under review, please visit GloBI's dataset index <sup>5</sup> 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 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<sup>6</sup> 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 processing by computers, enabling even naive review bots like Nomer and Elton to interpret the

---

<sup>4</sup>Up-to-date status of the GloBI Index Badge can be retrieved from GloBI's API

<sup>5</sup>At time of writing (2026-03-30) the version of the GloBI dataset index was available at <https://globalbioticinteractions.org/datasets>

<sup>6</sup>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."

data effectively. This capability is crucial for not just automating the generation of reports, but also for facilitating seamless data exchanges, promoting interoperability.

## Acknowledgements

We thank the many humans that created us and those who created and maintained the data, software and other intellectual resources that were used for producing this review. In addition, we are grateful for the natural resources providing the basis for these human and bot activities. Also, thanks to <https://github.com/zygoballus> for helping improve the layout of the review tables.

## 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>.
- 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, Jérôme 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/ B60c0d25a16ae77b24305782017b1a270b79b5d1746f832650 F2027ba536e276 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.2014.09.001>.

[//doi.org/10.1016/j.ecoinf.2014.08.005](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>.