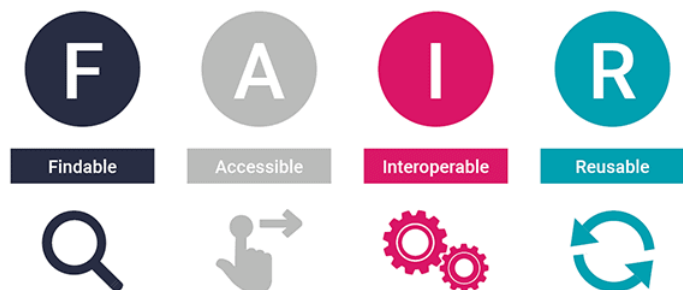


The GlobalFungi database: the FAIR global atlas of fungi

Petr Baldrian

FAIR data principles & open data



```
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```

BioSample

BioSample

Advanced

Full

Schiermonnikoog Fungal ITS

Identifiers

BioSample: SAMEA104212669; SRA: ERS1871687

Organism

soil metagenome

unclassified entries; unclassified sequences; metagenomes; ecological metagenomes

Attributes

collection date	2012
broad-scale environmental context	Salt marsh
local-scale environmental context	Soil chronosequence
environmental medium	Soil
geographic location	Netherlands
investigation type	mimarks-survey
project name	Schiermonnikoog Fungal ITS
sample name	SchierFungal_ITS_59
ENA first public	2017-08-17
ENA last update	2017-08-14
ENA-CHECKLIST	ERC000022
External Id	SAMEA104212669
INSDC center alias	UNIVERSITY OF GRONINGEN
INSDC center name	UNIVERSITY OF GRONINGEN
INSDC first public	2017-08-17T17:03:06Z
INSDC last update	2017-08-14T17:15:05Z
INSDC status	public
Submitter Id	SchierFungal_ITS_59
geographic location (depth)	0.1
geographic location (elevation)	0
geographic location (latitude)	53.4785962
geographic location (longitude)	6.1560311
sequencing method	Illumina MiSeq
soil environmental package	soil

FAIR data principles & open data

← → ↻ 🏠 <https://microbeatlas.org/index.html?action=samples>

🟠 🟡 🟢 🔴 BETA Taxa Samples Projects Publications Sample Groups MAPseq Information ▾

Explore more than 2 million analyzed samples

Samples Explorer


soil x ⓘ

Search Samples

Only Include Samples ⓘ
☒ With Taxa
☐ With Geographic Location

Only Display Samples ⓘ
☐ With Publications

Sequencing Protocols to Include
☒ Amplicon 1.7M
☒ Whole Genome Sequencing 180.9K
☒ RNA-Seq 18.7K
☒ Other Sequencing Protocols 230.1K

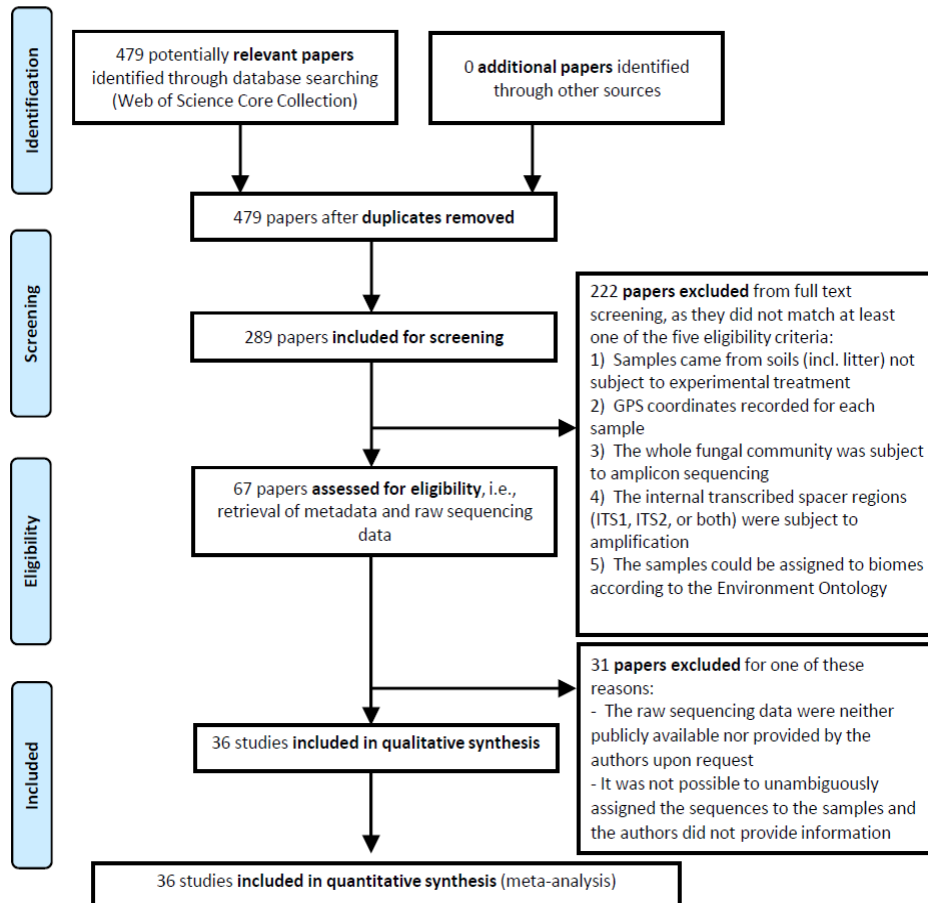


Leaflet | © OpenStreetMap, © MAP

How to best study fungal biodiversity and distribution on a global scale?

- Due to ecosystem diversity and enormous diversity of fungi, coordinated sampling efforts are unfeasible to cover global distribution of fungi
 - **Large data accumulated** over time in high-throughput sequencing studies
 - Data of sufficient quality can be used to model fungal distribution
 - Meta-analysis approaches and data re-analysis have high potential
- Collect available data from all published papers reporting fungal community composition
 - Use metadata on climate, vegetation, soil properties, vegetation, ... to identify drivers of fungal distribution and biodiversity

Fungal distribution through meta-analysis of published records



ARTICLE

<https://doi.org/10.1038/s41467-019-13164-8>

OPEN

A meta-analysis of global fungal distribution reveals climate-driven patterns

Tomáš Větrovský^{1,11}, Petr Kohout^{1,2,11}, Martin Kopecký^{3,4}, Antonín Machac^{2,5,6,7}, Matěj Man³, Barbara Doreen Bahnmann¹, Vendula Brabcová¹, Jinlyung Choi⁸, Lenka Meszárosová¹, Zander Rainier Huma Clémentine Lepinay¹, Salvador Lladó¹, Rubén López-Mondéjar¹, Tijana Martinović¹, Tereza Mašínová¹, Daniel Morais¹, Diana Navrátilová¹, Iñaki Odriozola¹, Martina Štursová¹, Karel Švec¹, Vojtěch Tláškal¹, Michaela Urbanová¹, Joe Wan⁹, Lucia Žižčáková¹, Adina Howe⁸, Joshua Ladau¹⁰, Kabir Gabriel Peay⁹, David Storch^{5,6}, Jan Wild³ & Petr Baldrian^{1*}

The evolutionary and environmental factors that shape fungal biogeography are incompletely understood. Here, we assemble a large dataset consisting of previously generated myco-biome data linked to specific geographical locations across the world. We use this dataset to describe the distribution of fungal taxa and to look for correlations with different environmental factors such as climate, soil and vegetation variables. Our meta-study identifies climate as an important driver of different aspects of fungal biogeography, including the global distribution of common fungi as well as the composition and diversity of fungal communities. In our analysis, fungal diversity is concentrated at high latitudes, in contrast with the opposite pattern previously shown for plants and other organisms. Mycorrhizal fungi appear to have narrower climatic tolerances than pathogenic fungi. We speculate that climate change could affect ecosystem functioning because of the narrow climatic tolerances of key fungal taxa.

The GlobalFungi Database

All publicly available data on
fungal community composition
from published scientific
papers

OPEN FAIR DATA

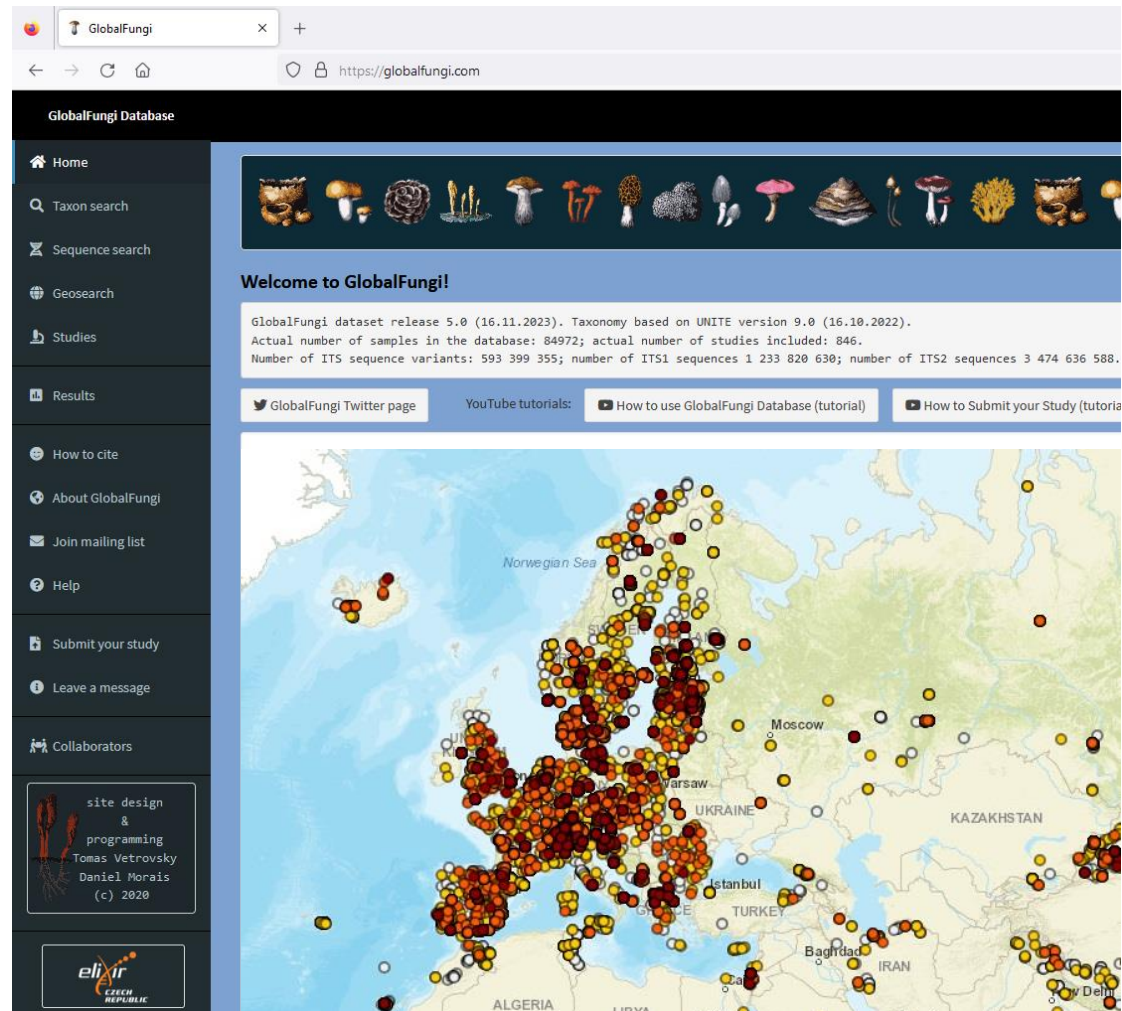
Release 5
November 2023

84 972 samples

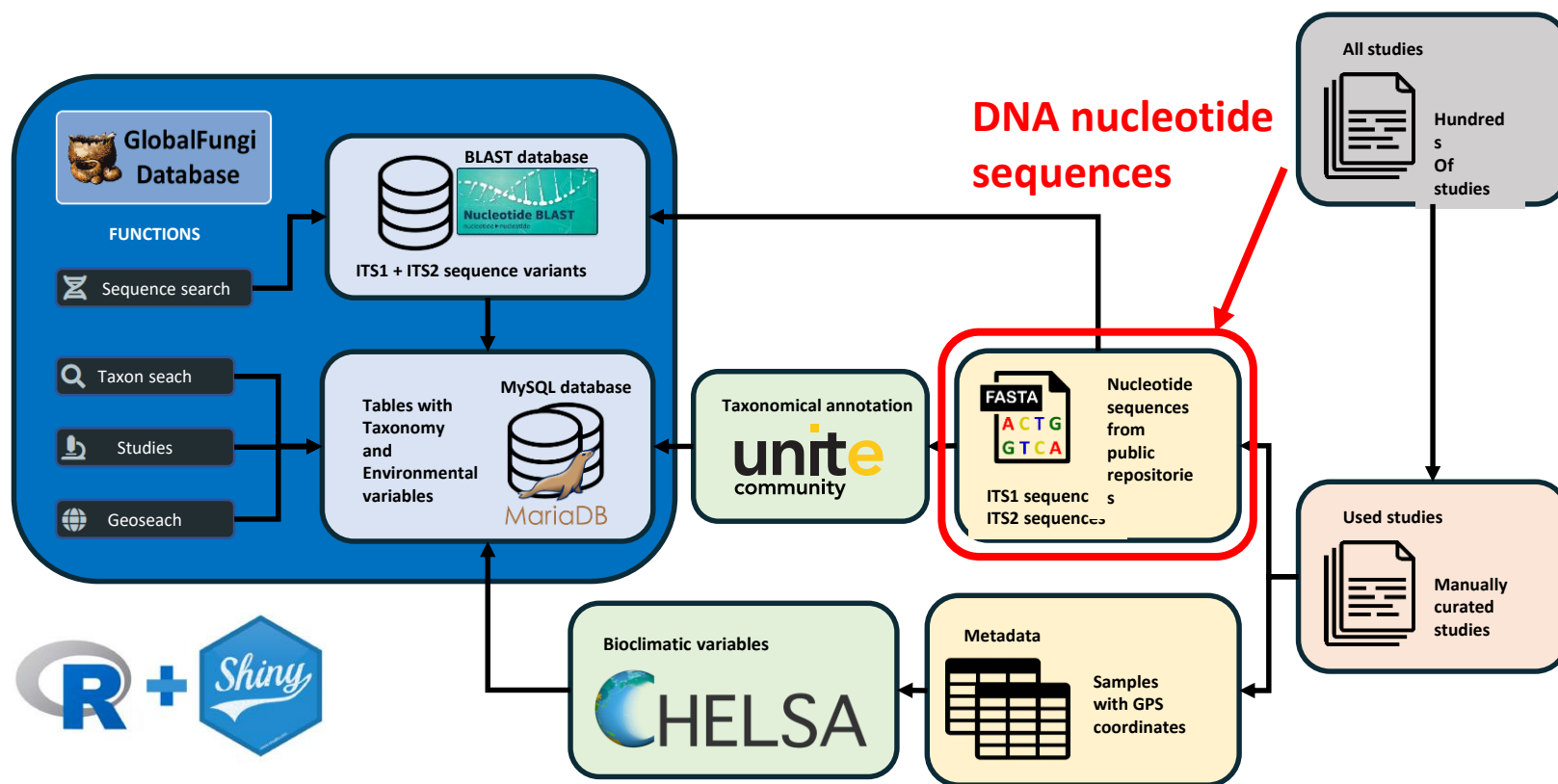
77 000 species of fungi

5 billion of observations of fungi
globally

<https://globalfungi.com>



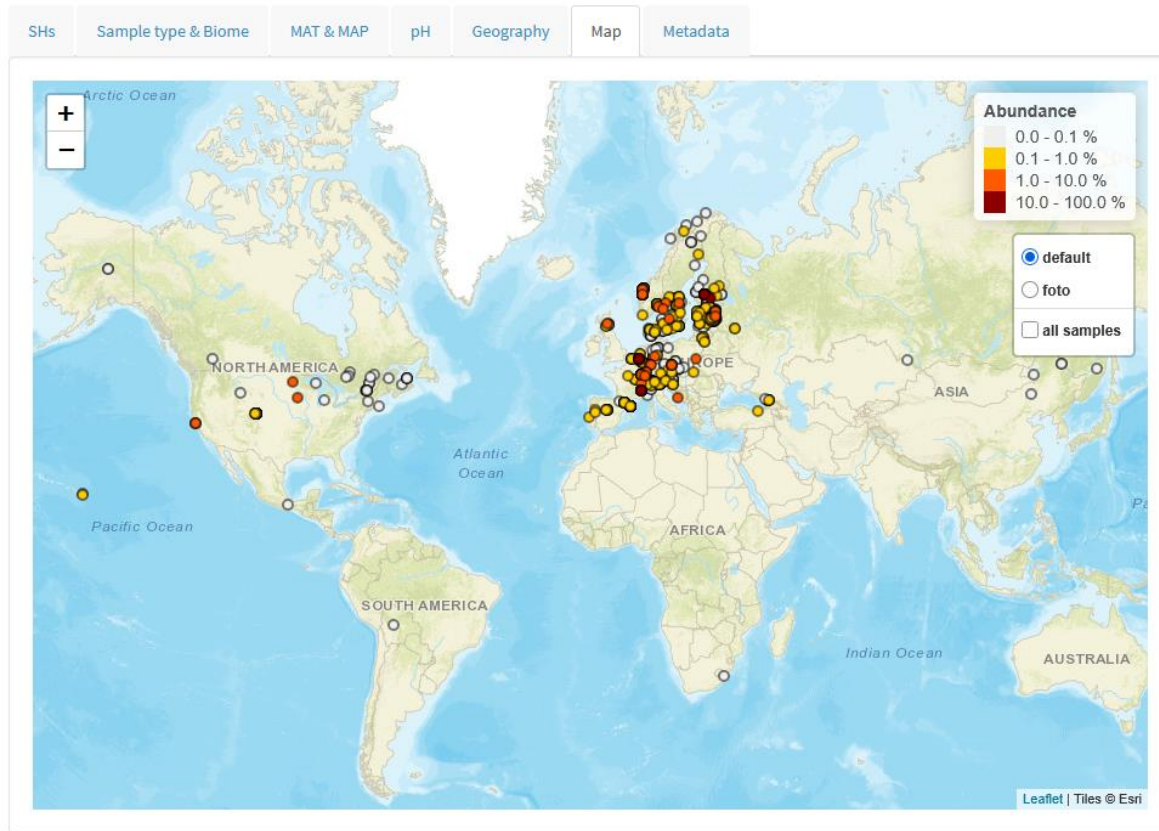
Data, metadata and annotation tools in the GlobalFungi Database



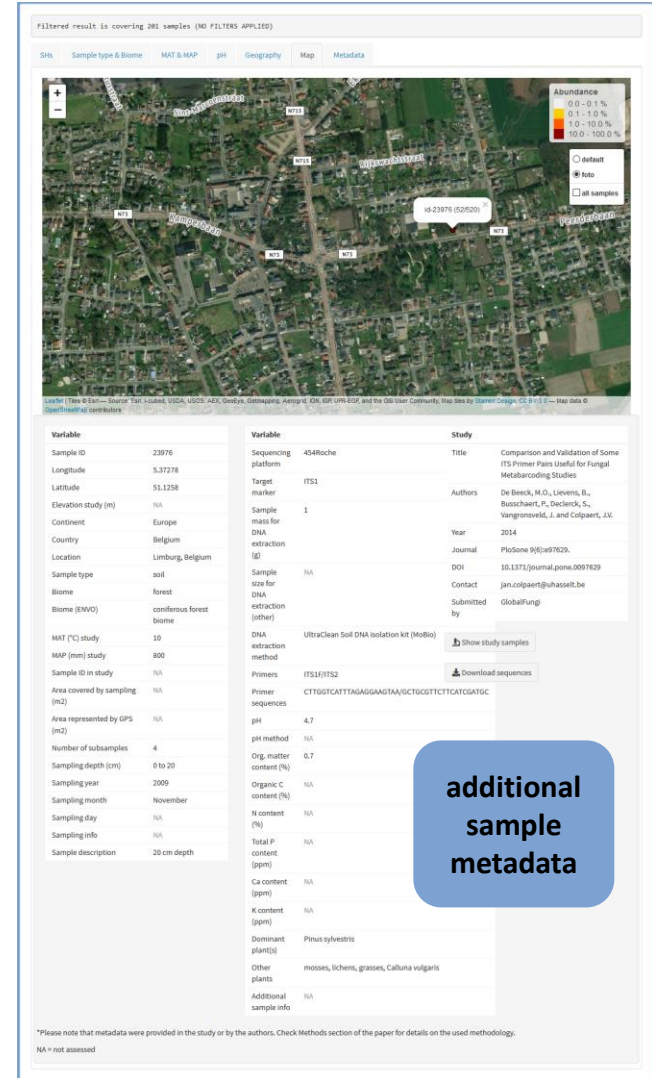
metadata

- The database is a service of ELIXIR-CZ Research Infrastructure
- ELIXIR-CZ provides hardware and contributes to development

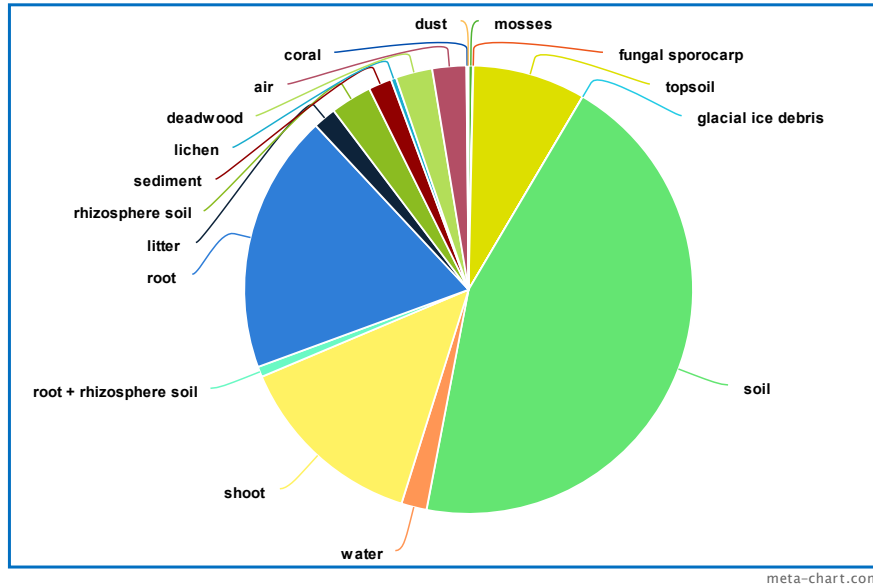
Database content – fungal species



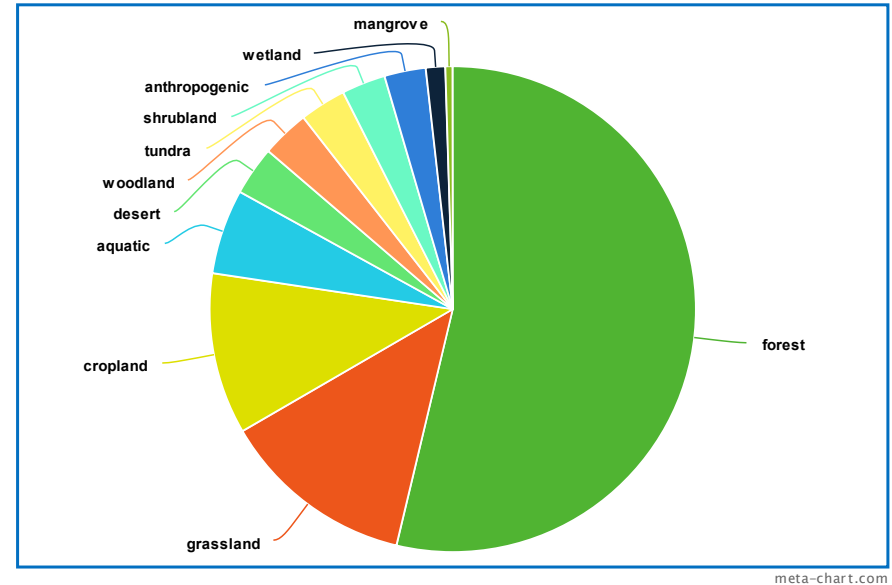
Boletus edulis



Database content - samples



Sample types



Habitats

Database functions

Sequence search

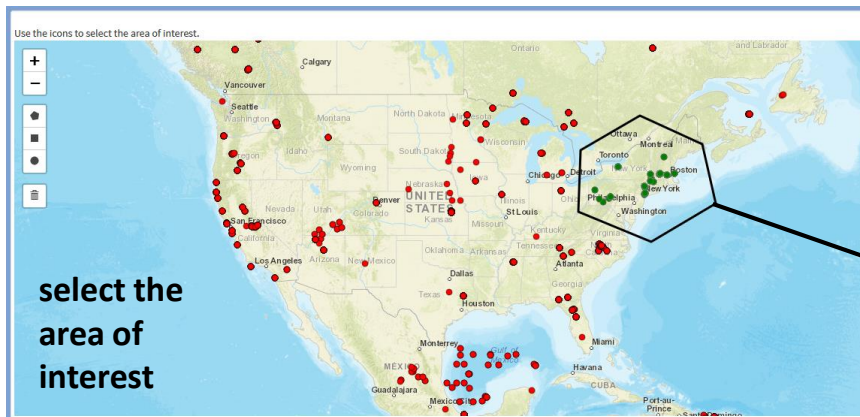
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Taxon search

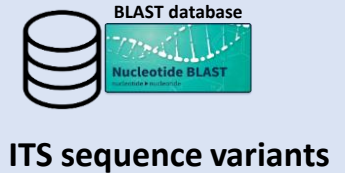
SH (e.g.: SH1644963.08FU)
Species (e.g.: *Boletus edulis*)
Genus (e.g.: *Boletus*)

Geosearch



Studies

Search (e.g.: "Plant invasion impacts on fungal community")



ITS sequence variants



Tables with taxonomy and Environmental variables

Download SH list

Show 10 entries

	SH	Kingdom	Phylum	Class	Order	
1	SH1523096.08FU	Fungi	Ascomycota	Leotiomycetes	Helotiales	Hyaloscypha
2	SH1958328.08FU	Fungi	Ascomycota	Sordariomycetes	Hypocreales	Hypocreaceae Trichoderma Trichoderma strigosum
3	SH1522247.08FU	Fungi	Mucoromycota	Umbelopsidomycetes	Umbelopsidales	Umbelopsis Umbelopsis dimorpha
4	SH1511190.08FU	Fungi	Ascomycota	unidentified	unidentified	unidentified Ascomycota sp.
5	SH1357185.08FU	Fungi	Ascomycota	Leotiomycetes	Thieliales	Pseudeurotiaceae Pseudogymnoascus Pseudogymnoascus roseus
6	SH1144237.08FU	Fungi	Ascomycota	Sordariomycetes	Hypocreales	Nectriaceae Fusarium Fusarium oxysporum
7	SH1550295.08FU	Fungi	Ascomycota	Lecanoromycetes	Lecanorales	Parmeliaceae Parmelia Parmelia sulcata
8	SH1550743.08FU	Fungi	Basidiomycota	Tremellomycetes	Filobasidiales	Filobasidiaceae Goffeauzyma Goffeauzyma gastrica
9	SH1651362.08FU	Fungi	Basidiomycota	Microbotryomycetes	Microbotryomycetes_inf_incertae_sedis	Microbotryomycetes_inf_incertae_sedis Curvibasidium Curvibasidium cygneicolum
10	SH1303587.08FU	Fungi	Ascomycota	Sordariomycetes	Hypocreales	Hypocreaceae Trichoderma Trichoderma paravindescom

Showing 1 to 10 of 4,276 entries

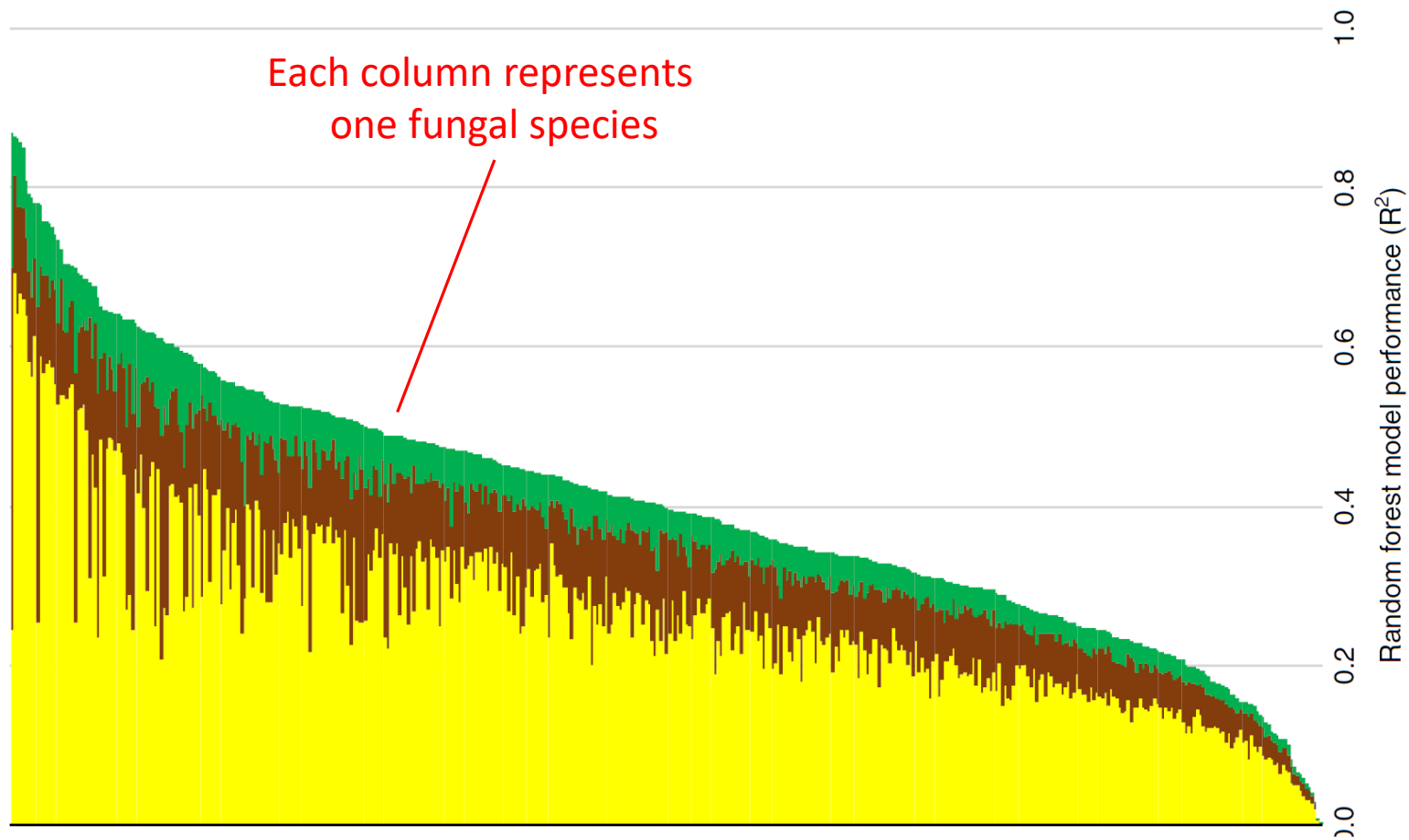
Previous 1 2 3 4 5 ... 428 Next

get observed species

Submit your study!

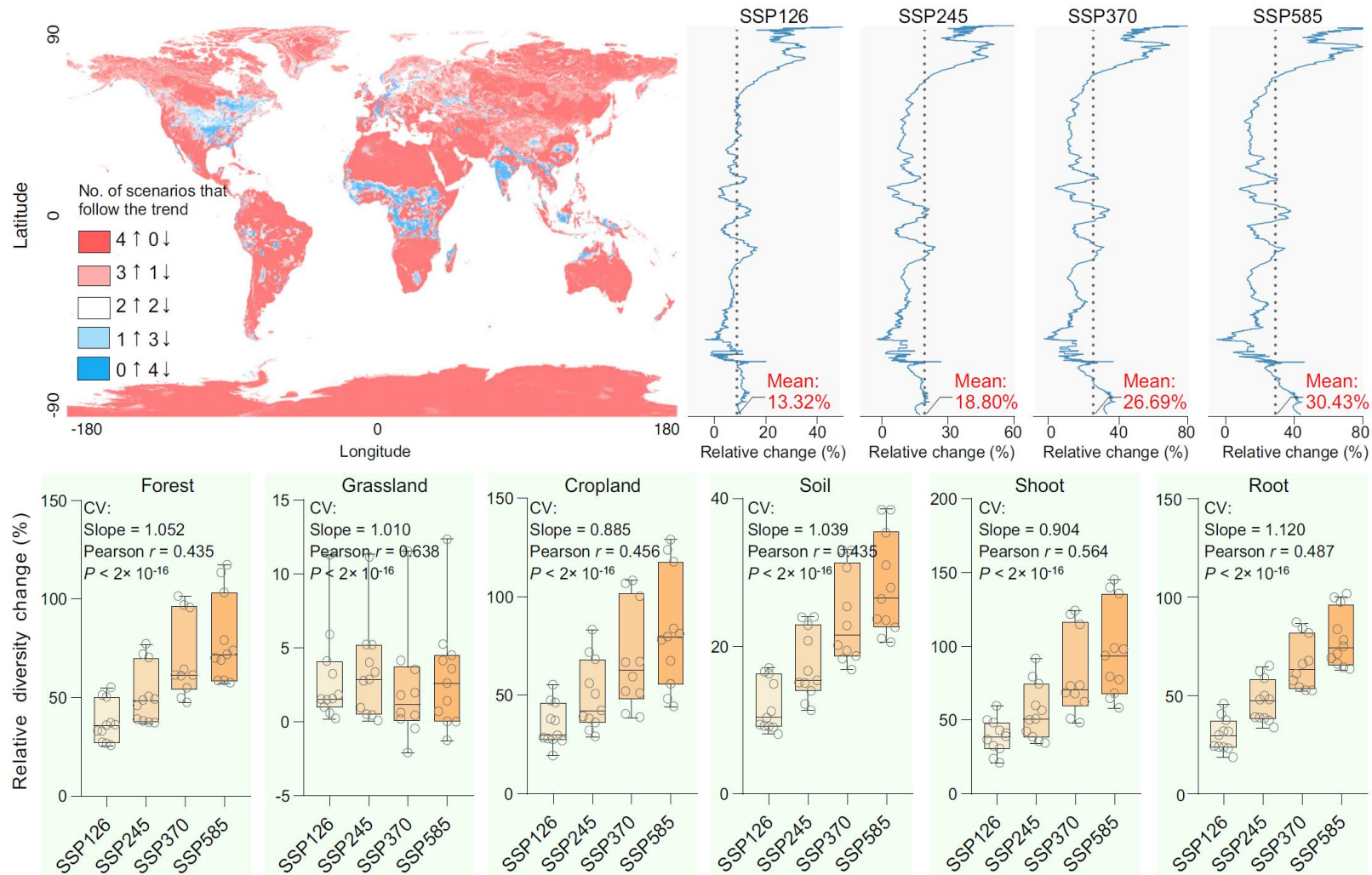
Both databases invites participation of the scientific community in that it encourages submission of data by the authors of studies that are not yet covered.

The science: Drivers of fungal distribution



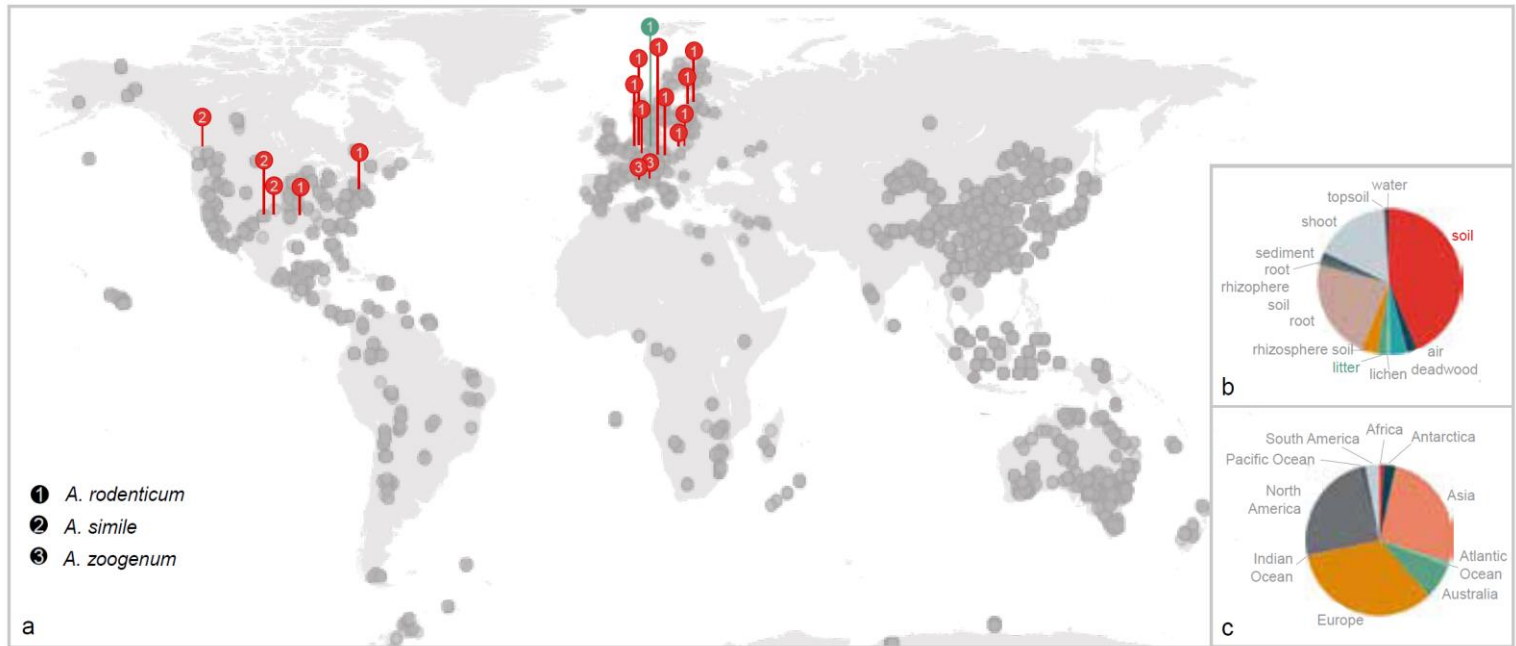
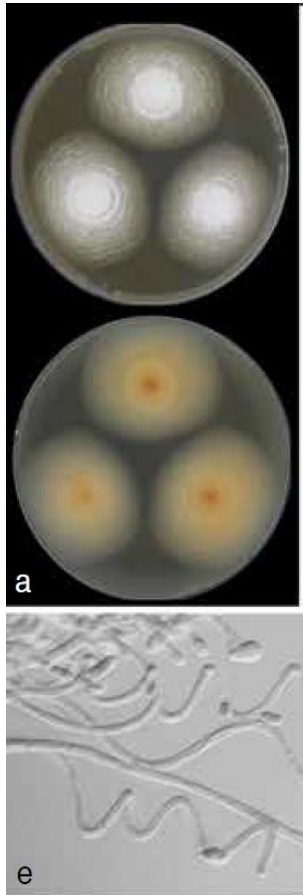
- Climatic factors explain most of fungal distribution.
- The most important climatic variables are complex, indicating, e.g., aridity

The science: The future of pathogens



- Increase in pathogen diversity is predicted under most climate change scenarios

The science: New species

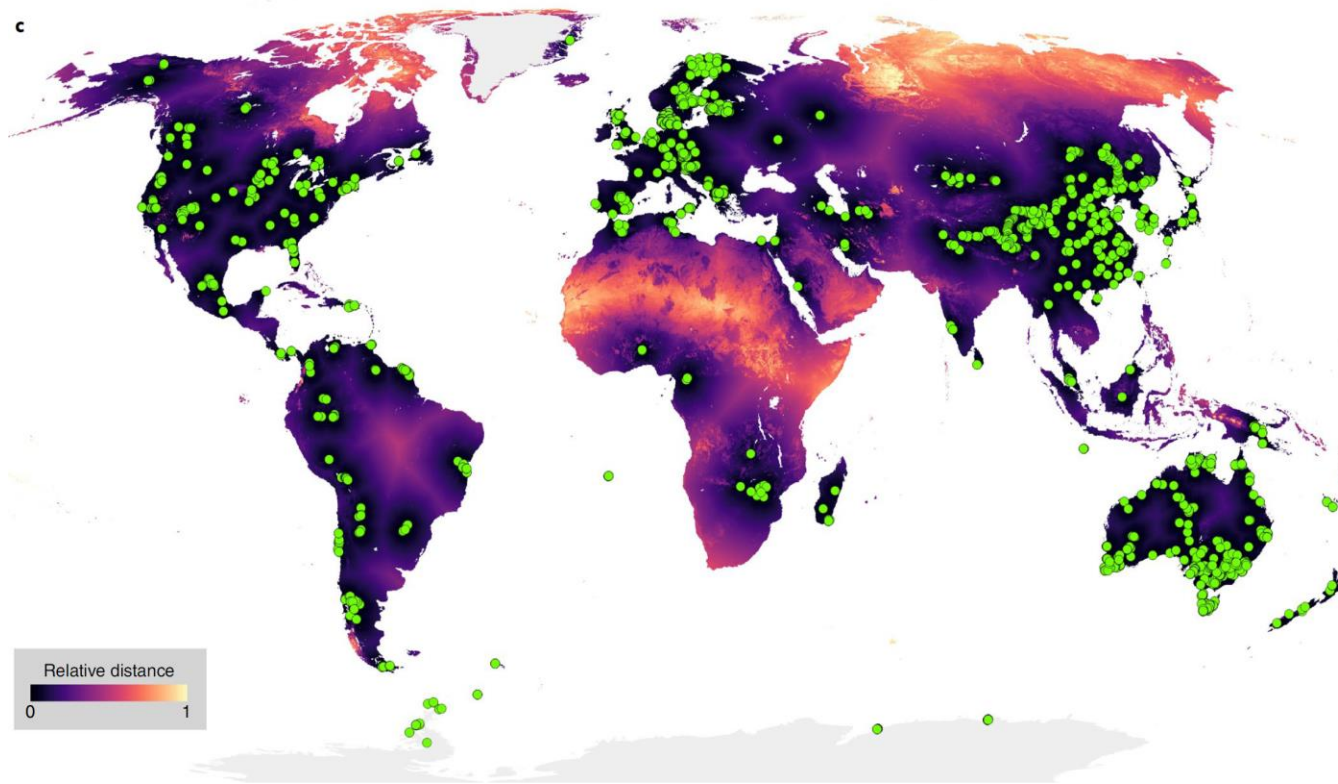


- Newly described, potentially pathogenic *Arthroderma* species from wild rodents. Where are their reservoirs?

Moulíková 2023 *Persoonia*

The science: Directing future research

Directing future research priorities



<https://www.spun.earth>

- Unexplored areas of global biodiversity

THANK YOU FOR YOUR ATTENTION

Petr Baldrian

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