



Global Biodiversity Information Facility

Dag Endresen - GBIF Norway

University of Oslo, Natural History Museum



GBIF

Global Biodiversity
Information Facility

Illustration: GBIF data portal

GBIF data seminar in Tromsø | 23rd May | 2024

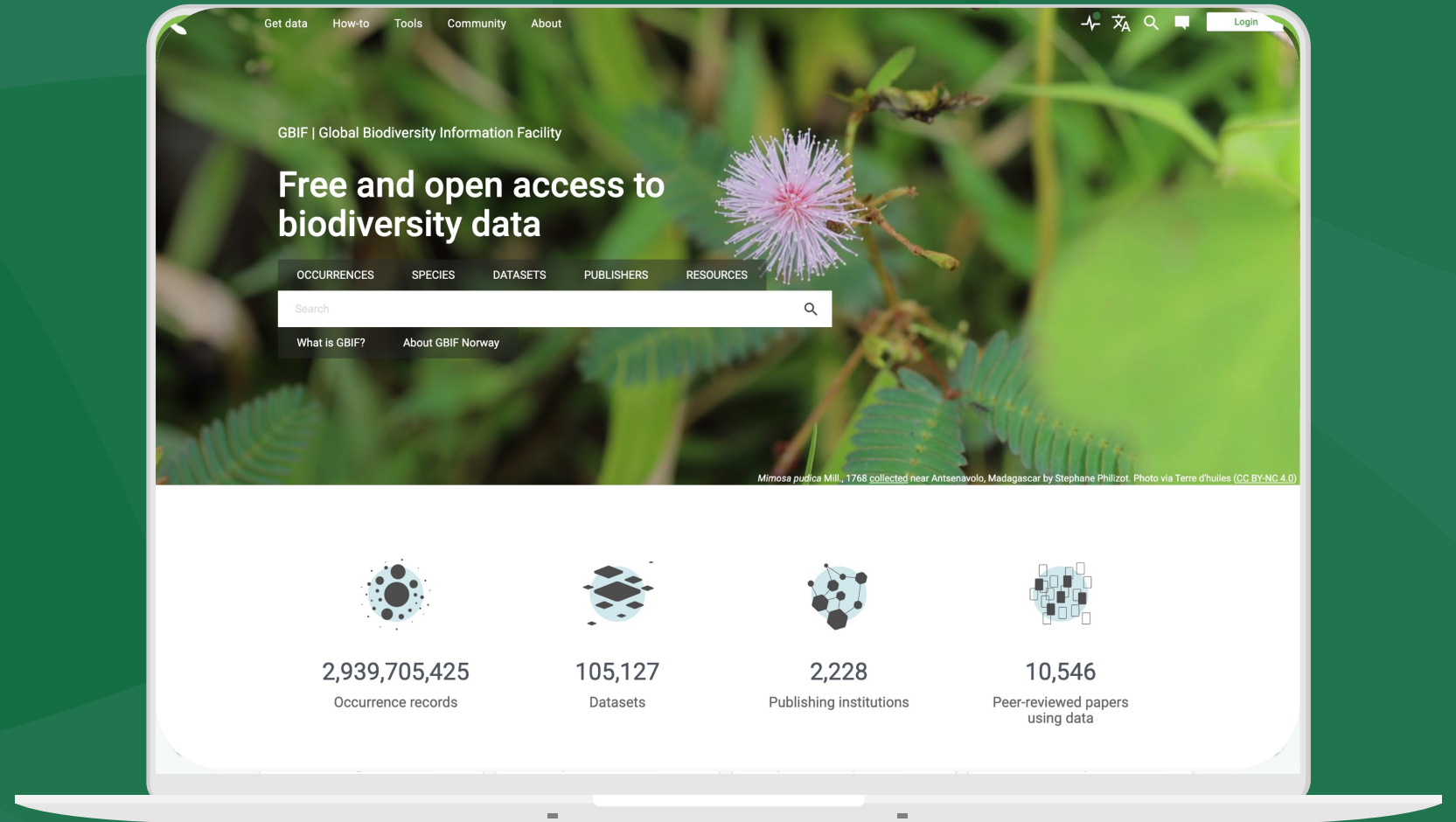
WHAT IS GBIF?

Intergovernmental network and research infrastructure

Provides anyone, anywhere, **free and open access to data** about all types of life on Earth

Voluntary collaboration through Memorandum of Understanding (MoU)

Participant nodes, Secretariat in Copenhagen, Denmark



Species occurrence records

2 939 705 425



Datasets

105 127



Country
Participants

63

Organizational
Participants

43



Peer-review papers
using data

10 546



Average records downloaded per month

119.7 billion



Publishers

2 228

BY THE NUMBERS | 23RD MAY 2024 - NORWAY

Species occurrence records
(published from Norway)



49 872 141

Datasets
(published from Norway)



446

Peer-review papers
using data (with co-
author from Norway)

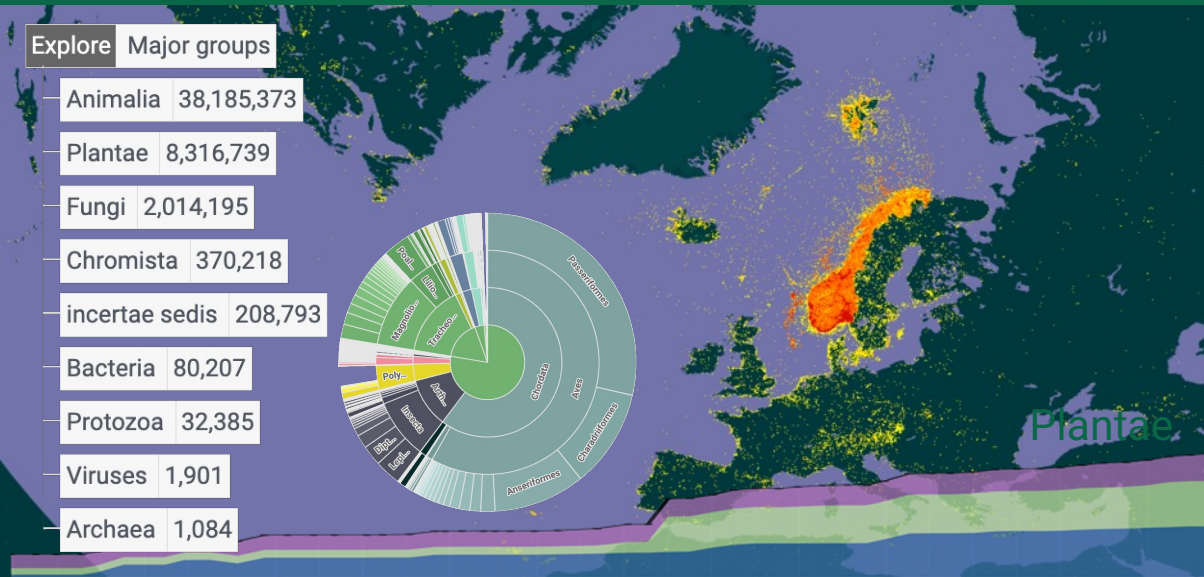


254

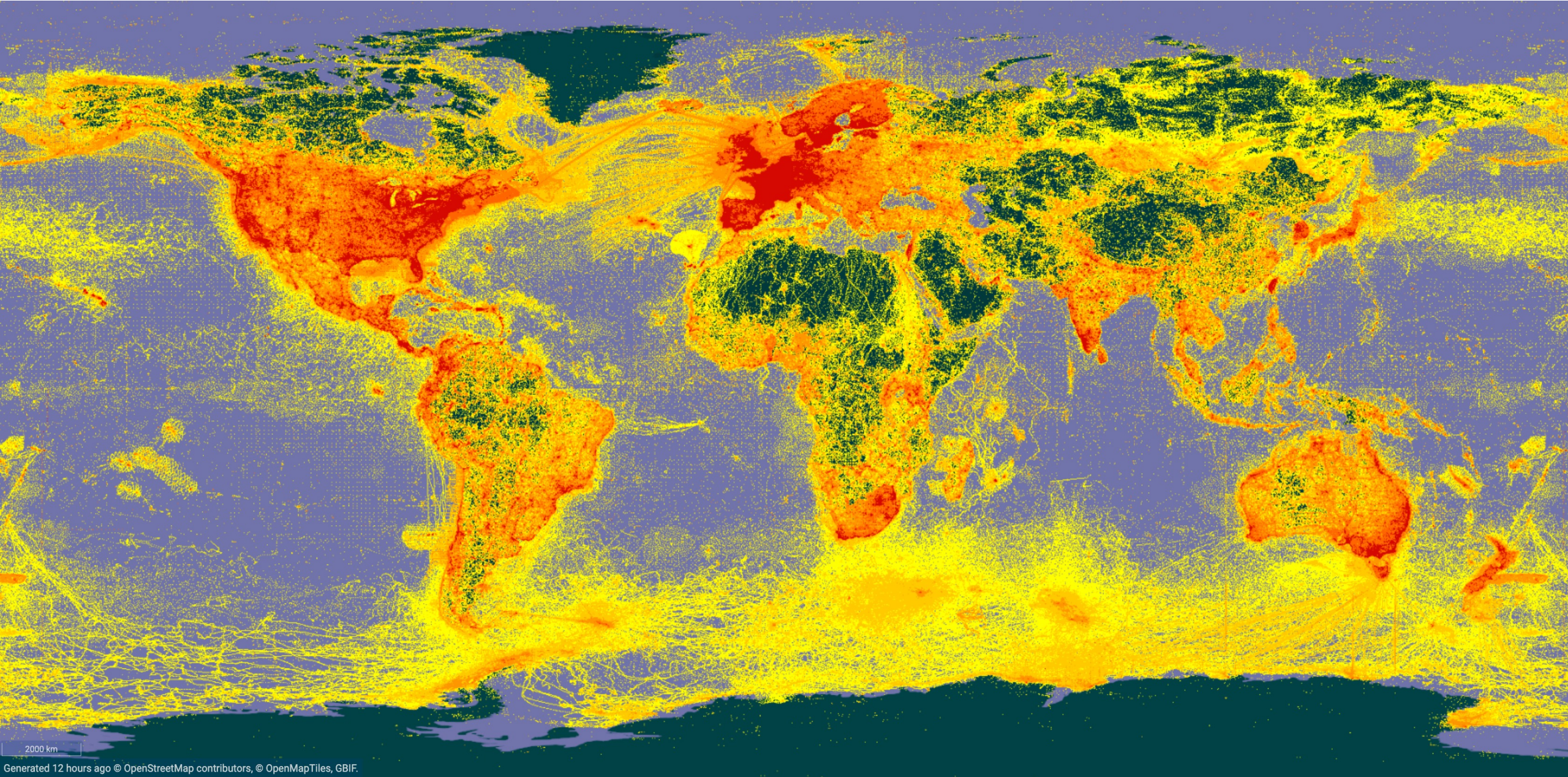
Publishers
(from Norway)



40



DATA FROM THE GBIF NETWORK 23rd May 2023



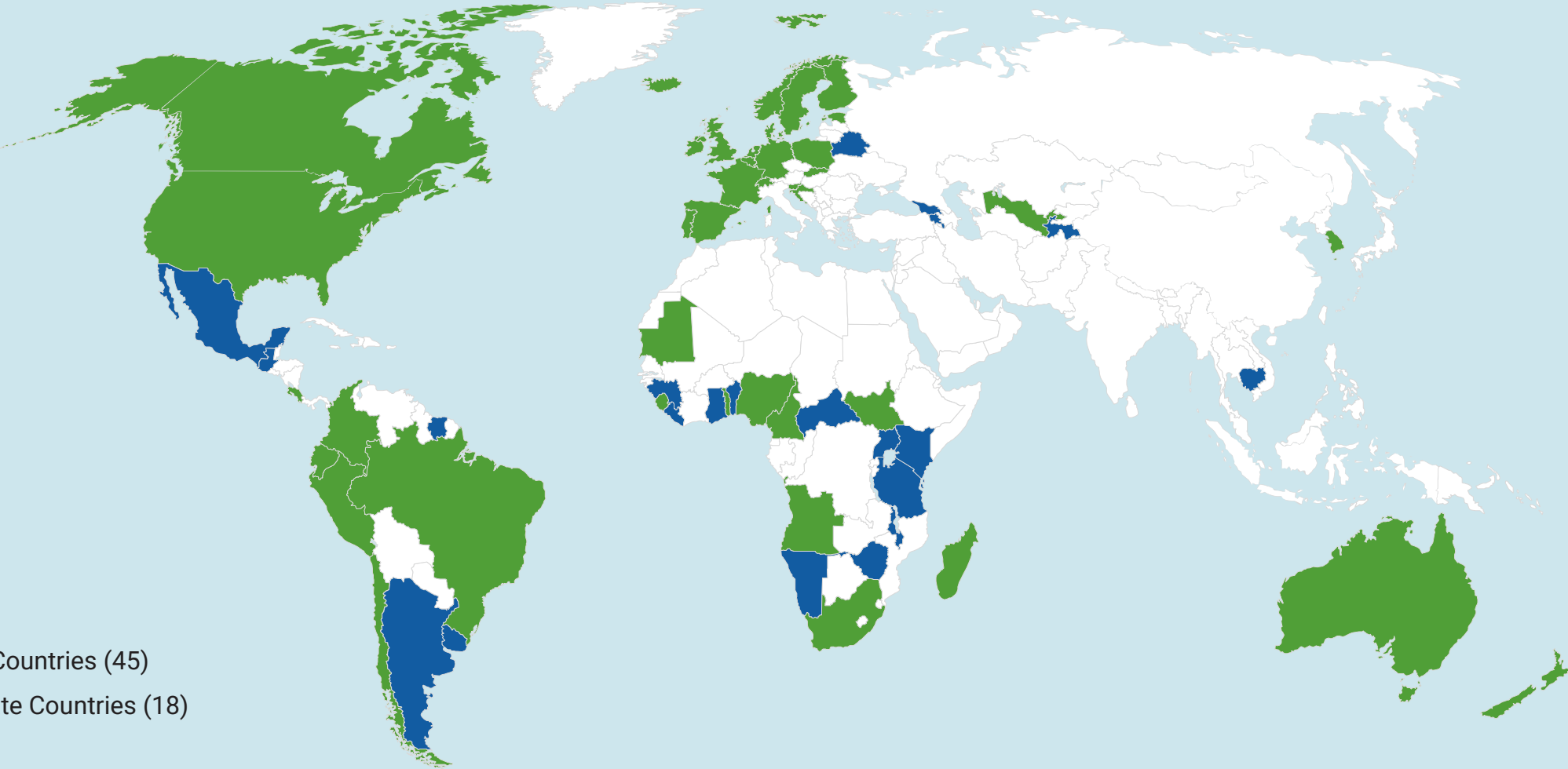
2000 km

Generated 12 hours ago © OpenStreetMap contributors, © OpenMapTiles, GBIF.

Any year 1600 - 2024

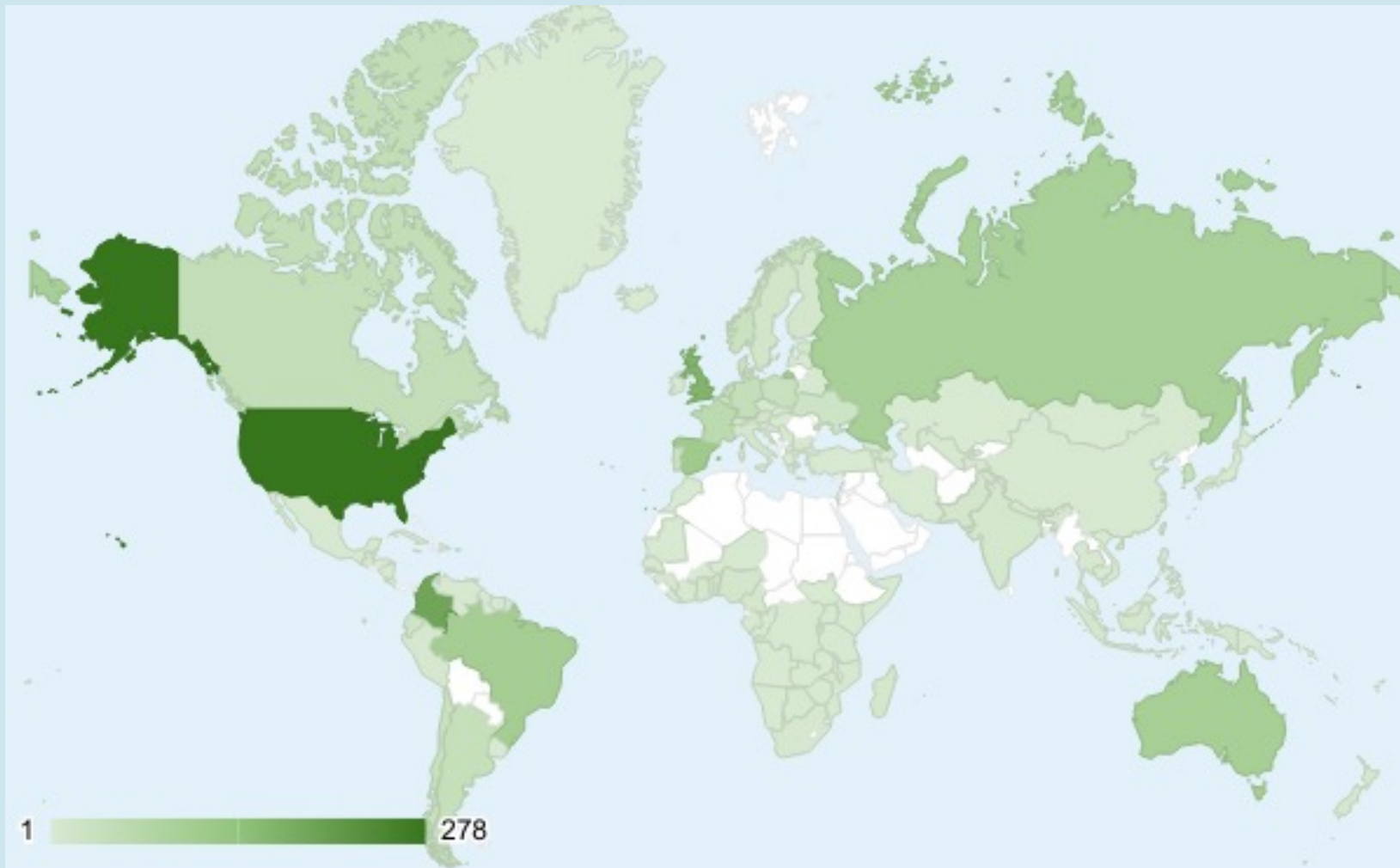
EXPLORE [Map Controls]

GBIF PARTICIPANT COUNTRIES 23rd May 2024



■ Voting Countries (45)
■ Associate Countries (18)

GBIF NETWORK OF DATA PUBLISHING INSTITUTIONS 23rd May 2024



134 countries/areas with institutions sharing data through GBIF

Top 10 countries: number of data publishers




1	United States	398
2	Colombia	223
3	United Kingdom	190
4	Australia	136
5	Russian Federation	131
6	Spain	130
7	Brazil	120
8	France	76
9	Canada	58
10	Netherlands	49
--	Norway	40

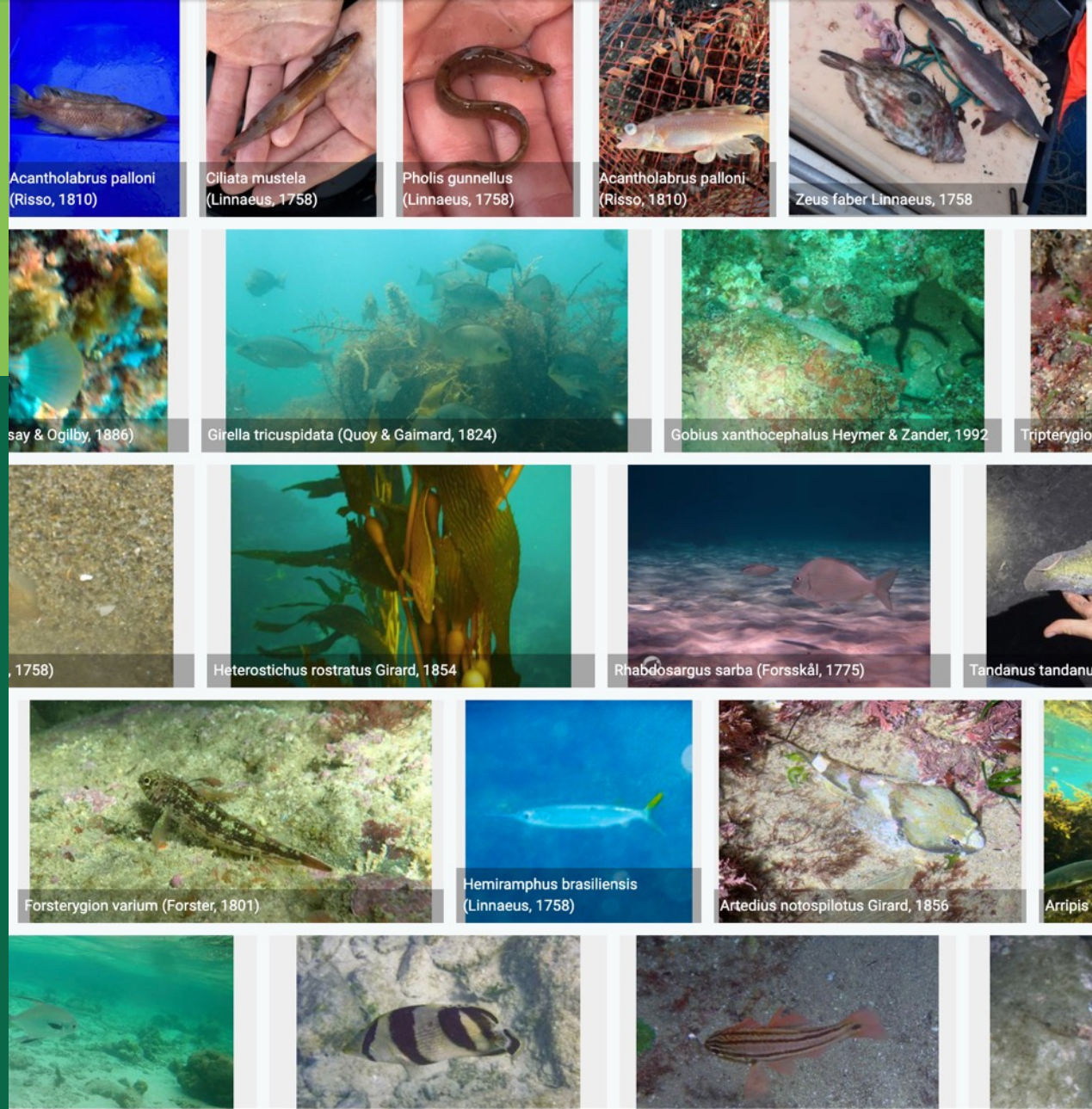
SPECIES OCCURRENCE RECORDS WITH MULTIMEDIA EVIDENCE

Status 23rd May 2024



Taxonomically identified multimedia records:

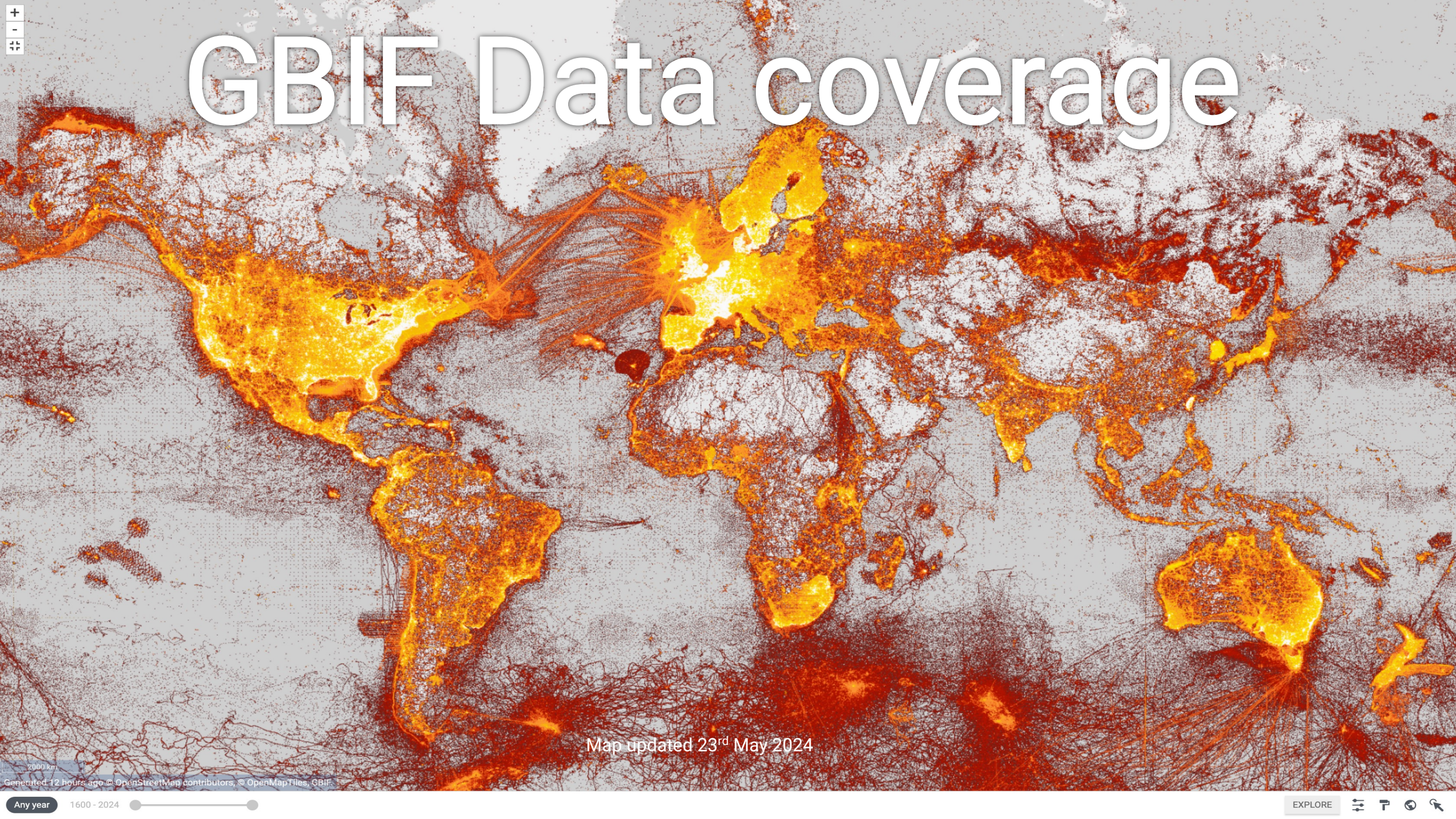
- 176 million images 
- 1,4 million audio files 
- 9 006 video files 
- 56 million specimens (with multimedia)
- 115 million human observations (w multimedia)





data coverage

GBIF Data coverage



Map updated 23rd May 2024

GBIF Data coverage

Map updated 23rd May 2024

1000 km

Generated 12 hours ago © OpenStreetMap contributors, © OpenMapTiles, GBIF

Any year 1600 - 2024

EXPLORE



GLOBAL BIODIVERSITY VS. DIGITALLY AVAILABLE DATA



1200 mill.
animals



300 m
plants



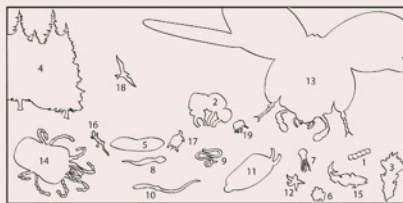
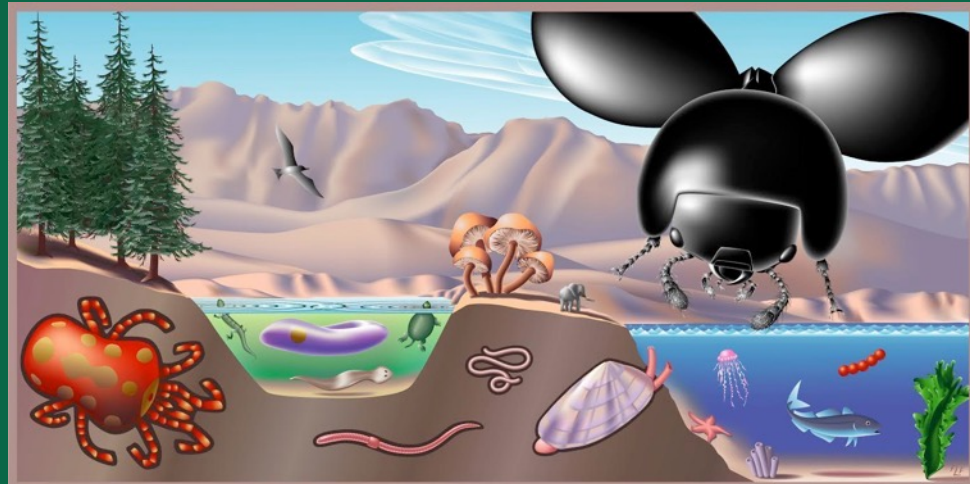
20 m
fungi



16 m
bacteria



0,04 m
virus



Size of individual organisms represents number of described species in major taxon.
Unit Area: □ = approximately 1,000 described species.

Taxon	No. of Described Species	Taxon	No. of Described Species
1 Monera (Bacteria, Blue-green Algae)	4,760	11 Mollusca (Mollusks)	50,000
2 Fungi	46,983	12 Echinodermata (Starfish etc.)	6,100
3 Algae	26,900	13 Insecta	751,000
4 Plantae (Multicellular Plants)	248,428	14 Non-insect Arthropoda	123,161
5 Protozoa	30,800	(Mites, Spiders, Crustaceans etc.)	19,058
6 Porifera (Sponges)	5,000	15 Pisces (Fish)	4,181
7 Coelenterata	9,000	16 Amphibia (Amphibians)	6,300
(Jellyfish, Corals, Comb Jellies)		17 Reptilia (Reptiles)	9,040
8 Platyhelminthes (Flatworms)	12,200	18 Aves (Birds)	4,000
9 Nematoda (Roundworms)	12,000	19 Mammalia (Mammals)	
10 Annelida (Earthworms etc.)	12,000		

Illustration by Frances L. Fawcett. From Q. D. Wheeler. 1990. Ann. Entomol. Soc. Am. 83:1031-1047.

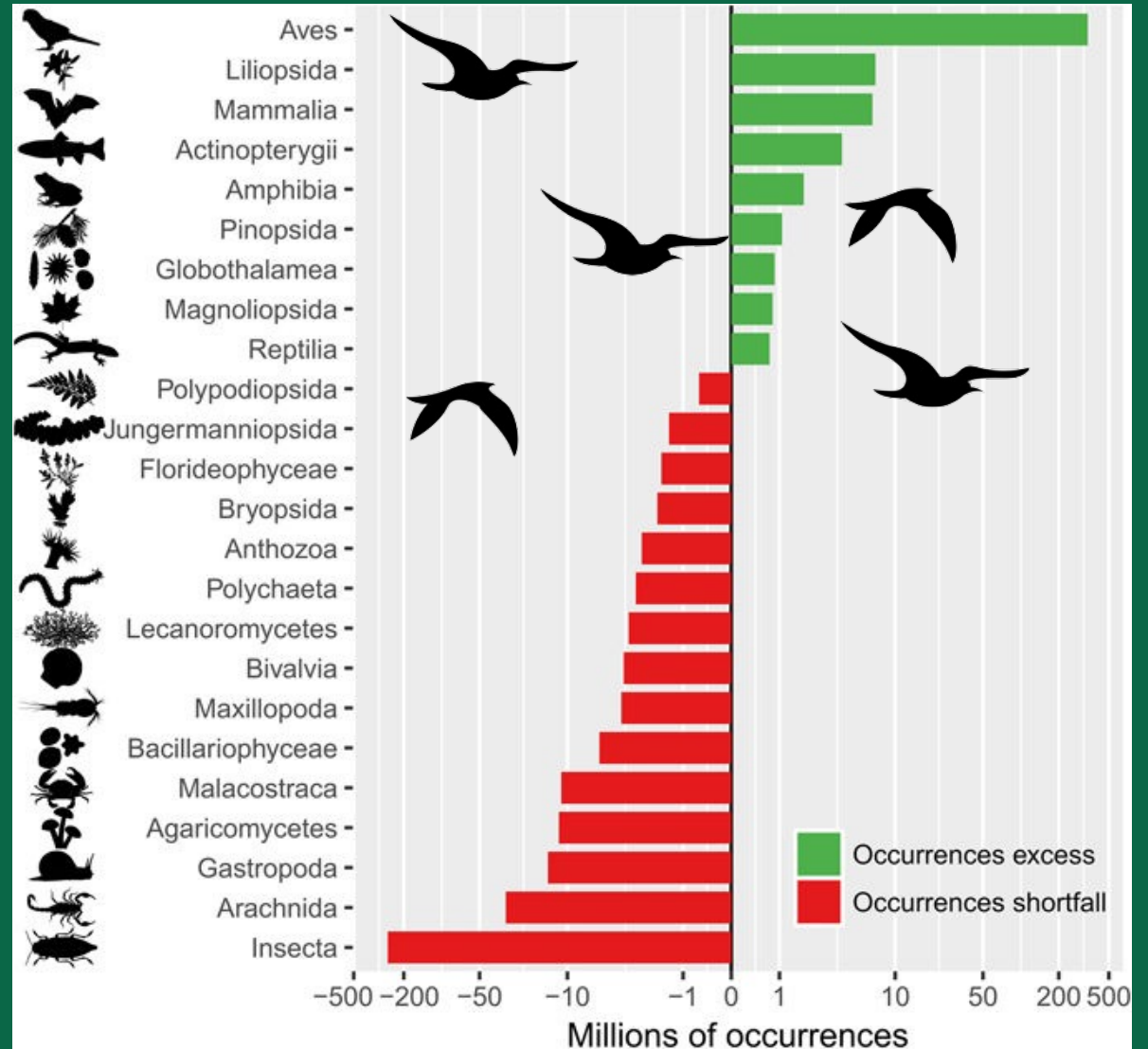
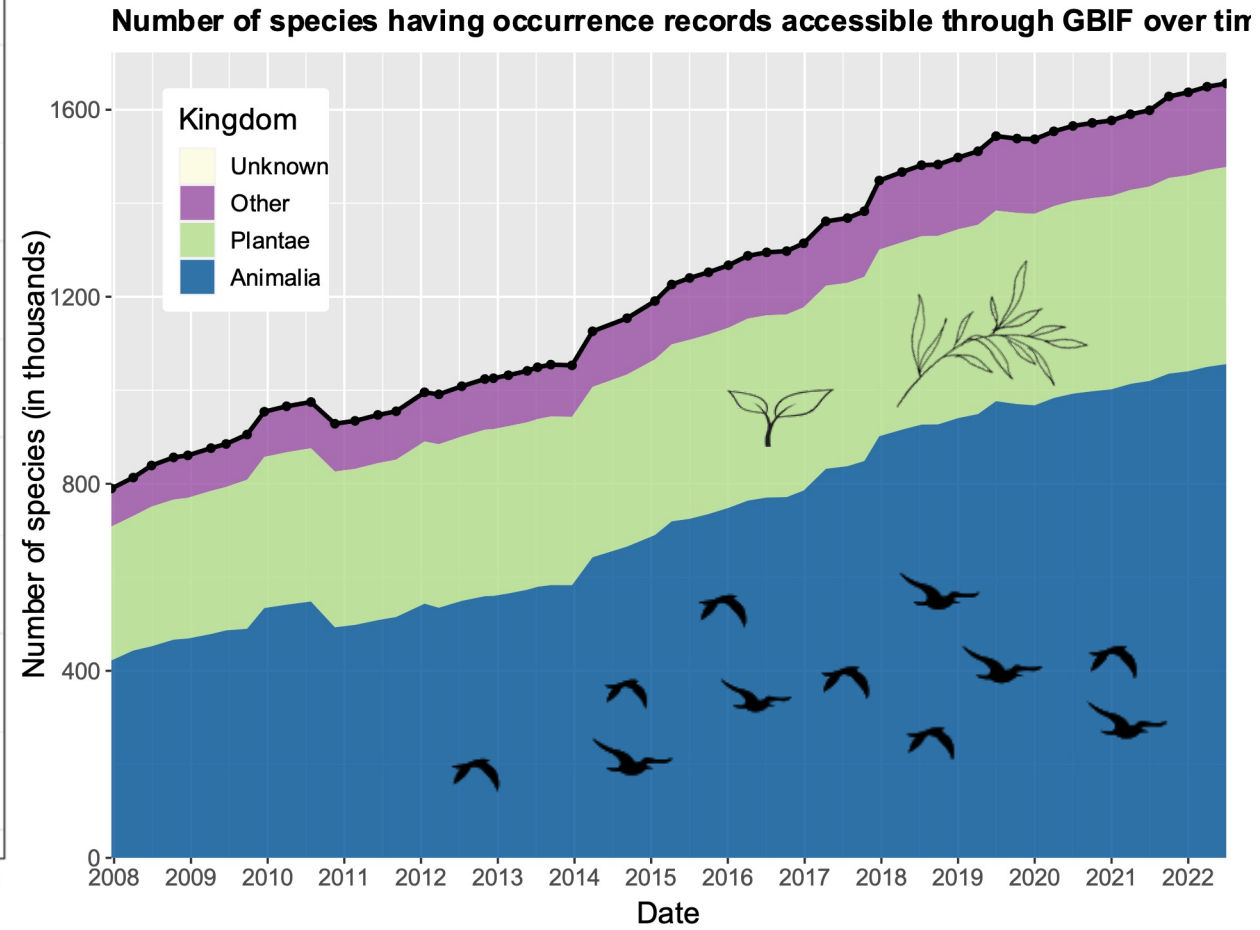
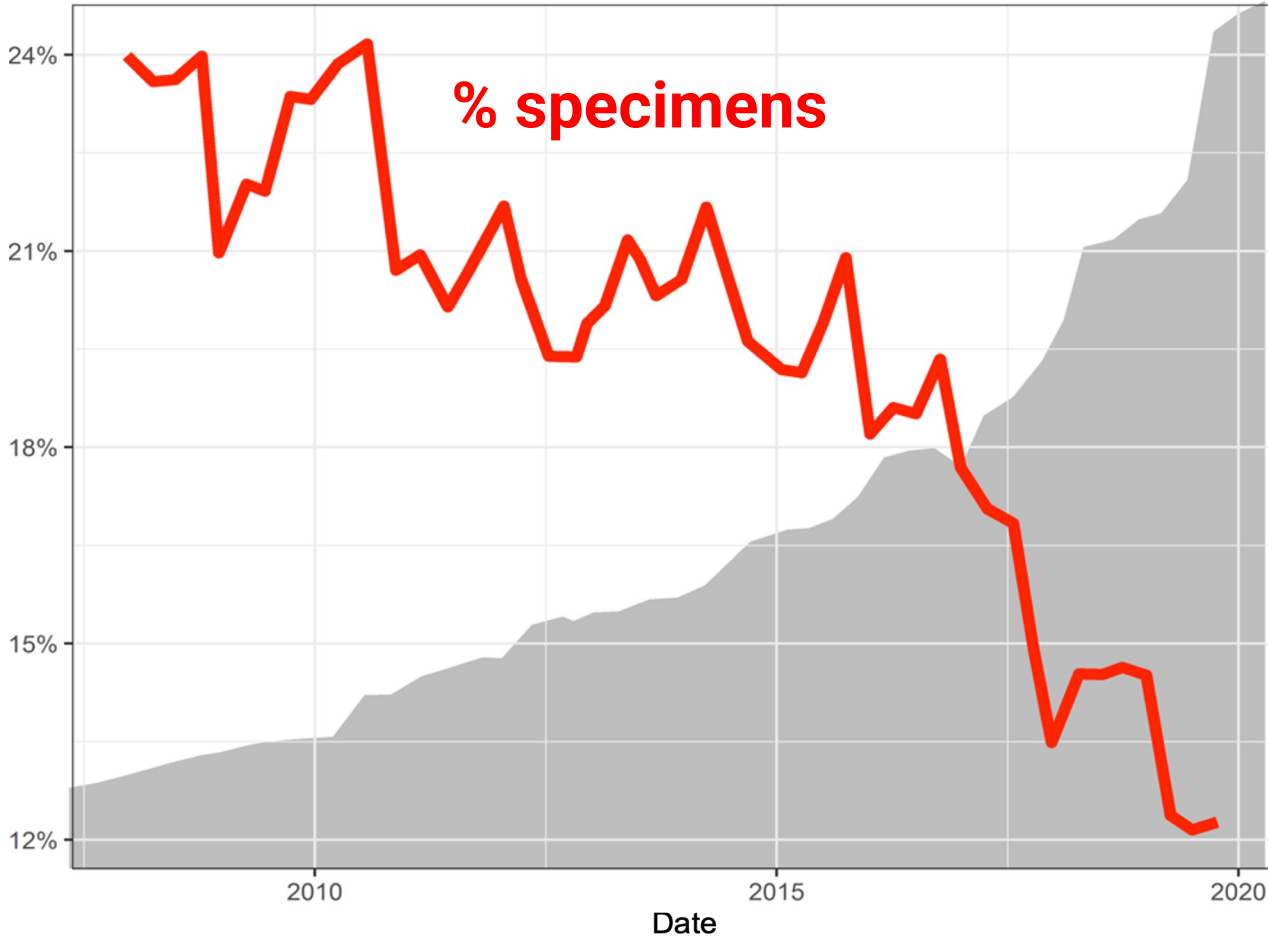


Image: FL Fawcett in Wheller Ann. Entomol. Soc. Am. 1990

Troudet et al. Nature Scientific Reports 2017

DATA TRENDS ON GBIF.org





Very few museum specimens are digitized

Natural history museum collections worldwide conserve an estimated **1.2 - 3 billion specimens**

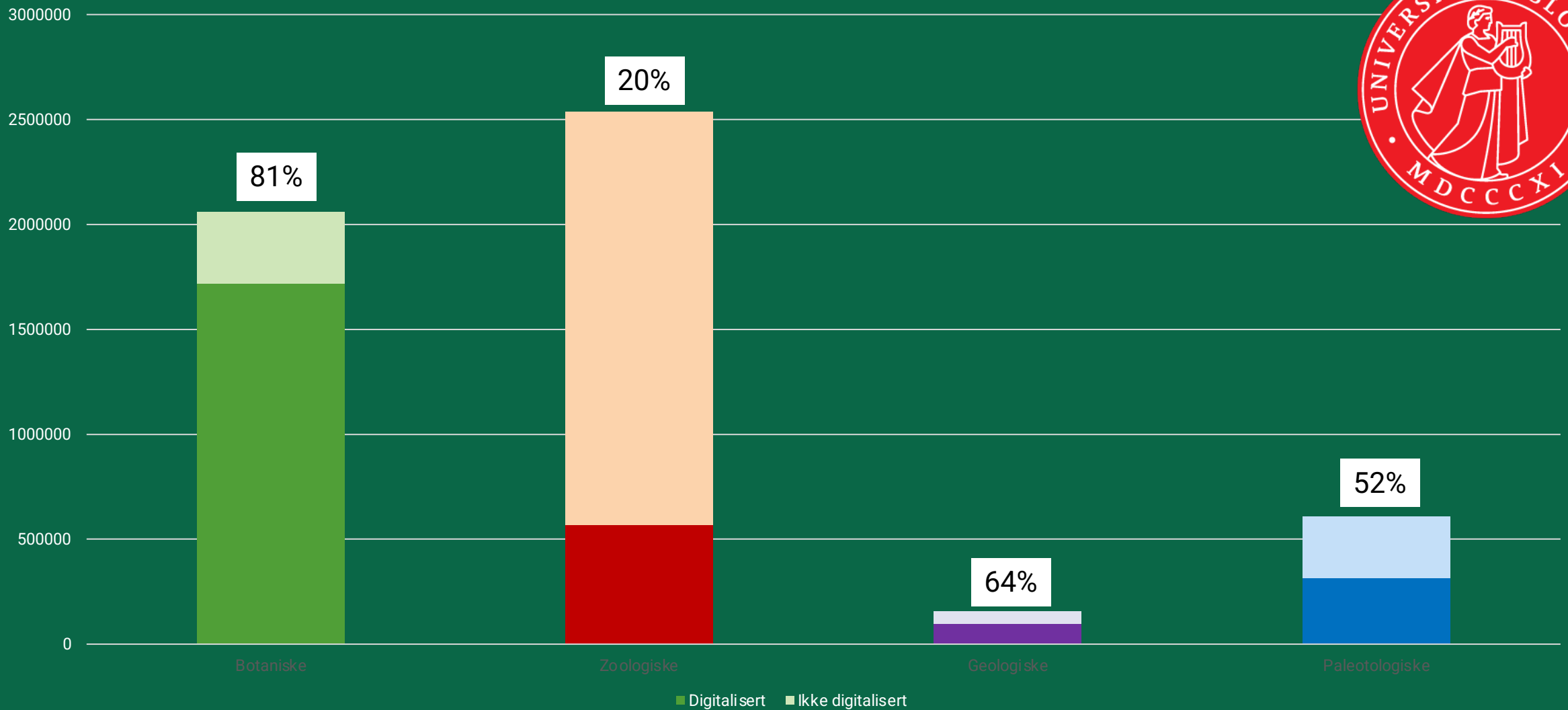
(Ariño 2010; Duckworth *et al.* 1993)

GBIF publishes 2,3 billion records – including **249 million specimens**

approx. 10% coverage?

Photo: Botany Collection, Algae, Smithsonian National Museum of Natural History Museum, by Chip Clark.

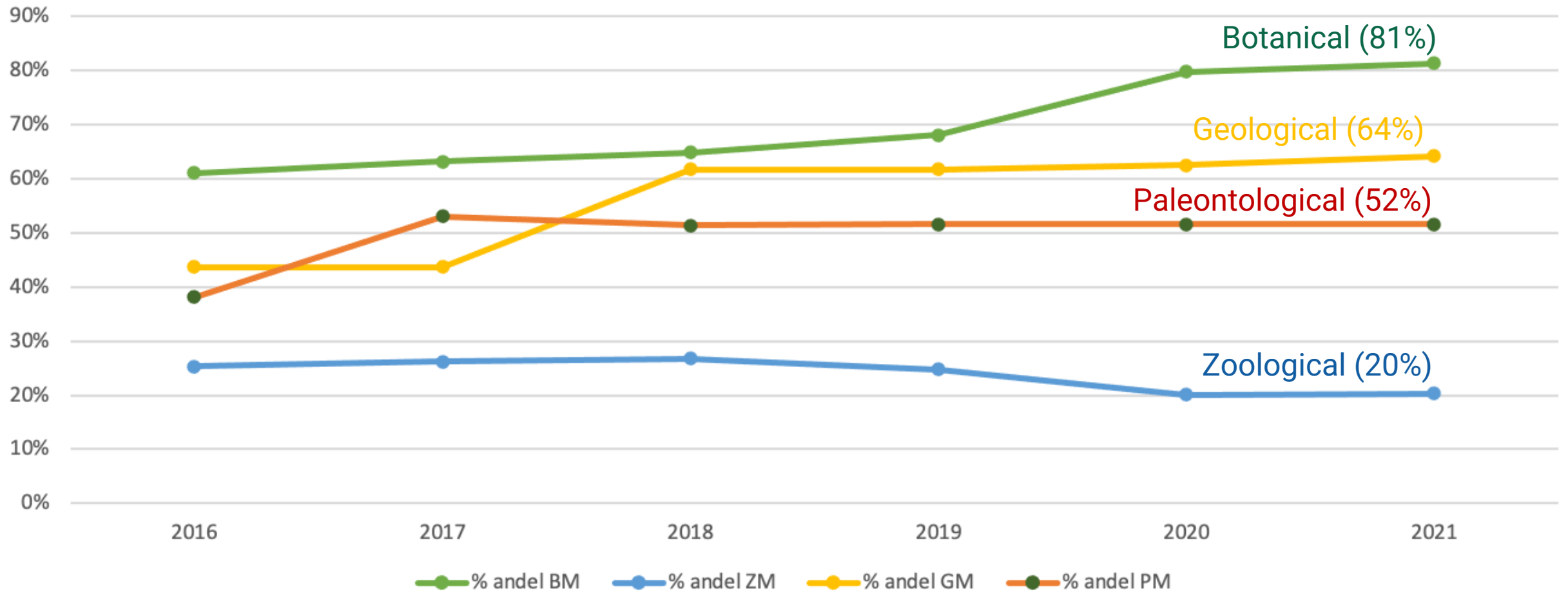
Specimens at UiO NHM Oslo (approx 52% digitized)



SPECIMENS AT UIO NHM OSLO (PROGRESS PROPORTION DIGITIZED)



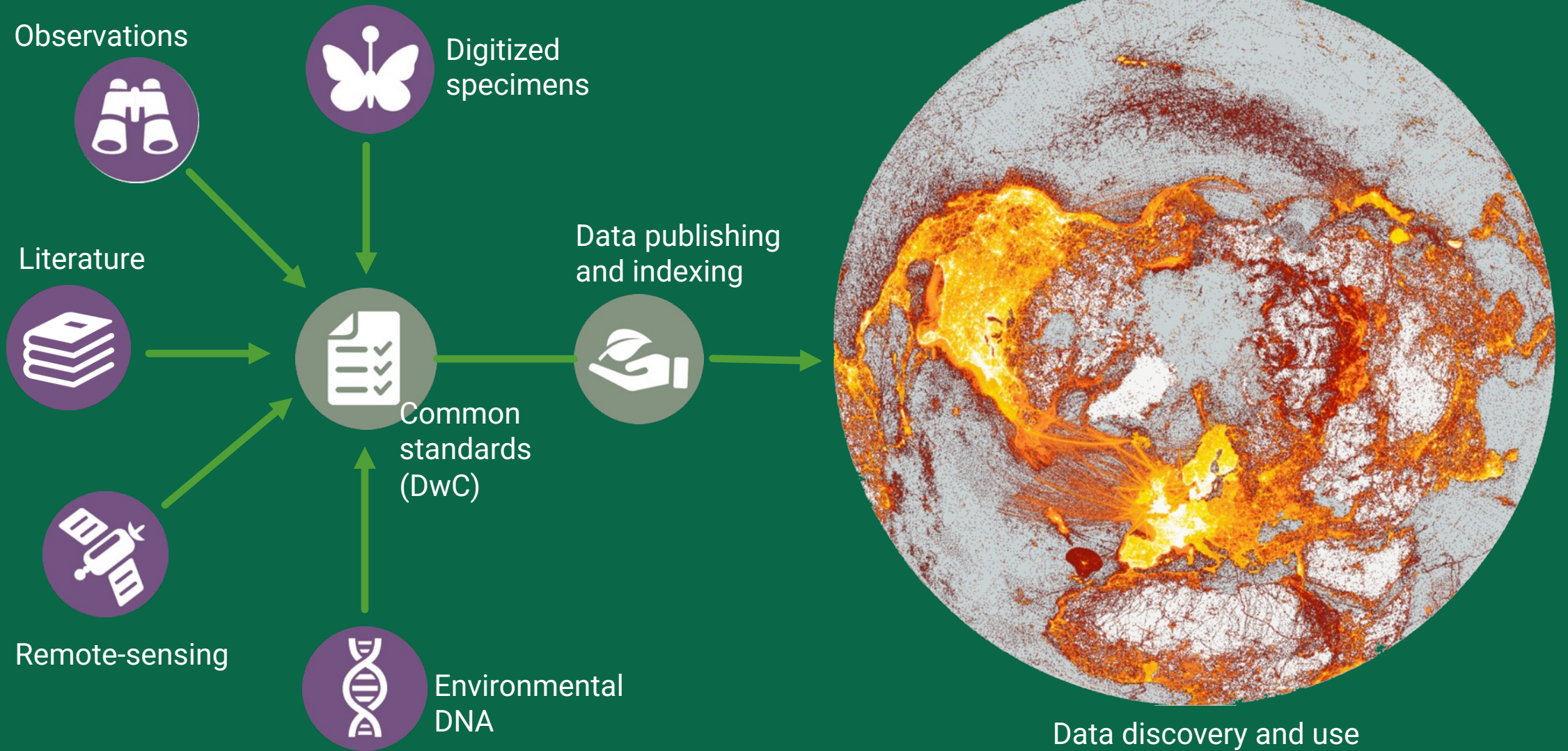
digitaliserings andel i %





biodiversity data types

A WINDOW ON EVIDENCE ABOUT WHERE SPECIES HAVE LIVED, AND WHEN



DATA RICHNESS LEVELS
SUPPORTED BY GBIF

FULL TITLE
BOS Arthropod Collection of University of Oviedo (S

*Dataset description,
taxonomic/geographic/temporal scope*



Dataset metadata

FLORA EUROPAEA FLORA EUROPAEA FLORA

*List of taxa
regional or thematic (e.g. invasive, medicinal)*



Species checklists

*Species occurrences
dates, coordinates, basis of record*



Species occurrence data

*Species occurrences and sampling events
dates, coordinates, sampling effort / protocol, abundance*



Sampling-event data

SOURCES OF DATA IN GBIF: DIGITIZED MUSEUM COLLECTION SPECIMENS

OCCURRENCE DATASET | REGISTERED JULY 30, 2012


Mycology herbarium, Oslo (O)

Published by [Natural History Museum, University of Oslo](#)

DATASET METRICS ACTIVITY DOWNLOAD HOME PAGE


215,107 OCCURRENCES 33 CITATIONS

Fungi in the Natural History Museum, University of Oslo



Metadata last modified: October 7, 2020
Hosted by: [GBIF.no](#)
License: CC BY 4.0
How to cite: [DOI: 10.15468/6sjpjd](#)

98% With year



EXPLORE

Generated 2 hours ago

Any year

4,098 OCCURRENCES

SEE GALLERY

OCCURRENCE DATASET | REGISTERED JULY 30, 2012

Mycology herbarium, UiB

Published by [University of Bergen](#)

DATASET METRICS ACTIVITY DOWNLOAD

16,569 OCCURRENCES 105 CITATIONS

The Fungus Herbarium contains about 16 000 specimens. The majority of the collection data have been recorded (with the exception of inter alia Myxomycetes) and are searchable in the common Norwegian Fungus Database (see below). Jens Stordal's macro-fungi collections constitute a significant part of the fungus collection in Bergen.

Publication date: March 3, 2023
Metadata last modified: March 3, 2023
Hosted by: [GBIF Norway](#)
Licence: CC BY 4.0
[How to cite](#) [DOI: 10.15468/tbx1rm](#)


16,569 Occurrences

99% With taxon match

20% With coordinates

98% With year

3,358 GEOREFERENCED RECORDS



Generated 44 minutes ago © OpenStreetMap contributors, © OpenMapTiles, GBIF.

Any year 1836 - 2020

EXPLORE

Description

Geographic scope

Contacts

Data description

GBIF registration

Citation

Description

The Fungus Herbarium contains about 16 000 specimens. The majority of the collection data have been recorded (with the exception of inter alia Myxomycetes) and are searchable in the common Norwegian Fungus Database (see below).

Jens Stordal's macro-fungi collections constitute a significant part of the fungus collection in Bergen.

SOURCES OF DATA IN GBIF: TAXONOMIC LITERATURE, OLD AND NEW

OCCURRENCE DATASET | REGISTERED SEPTEMBER 18, 2014

All observations extracted from the Flora of Northumberland and Durham 1831

Published by [Botanic Garden Meise](#)
Quentin Groom • Quentin Groom

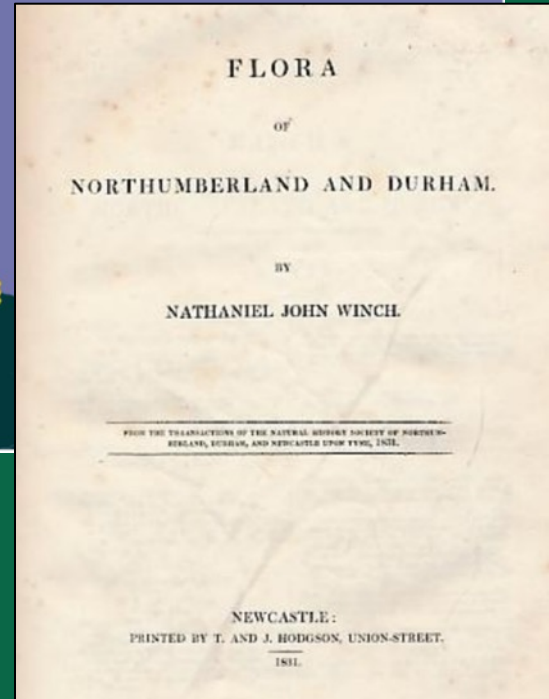
DATASET METRICS ACTIVITY DOWNLOAD HOME PAGE

5,583 OCCURRENCES 62 CITATIONS

5,583 GEOREFERENCED RECORDS



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Get data How-to Tools Community About

TREATMENT ARTICLE | REGISTERED APRIL 2, 2018

Review of the Palaearctic species of Ismaridae Thomson, 1858 (Hymenoptera: Diaprioidea)

Mediated by [Plazi.org taxonomic treatments database](#)
Chang-Jun Kim • David G. Notton • Frode Ødegaard • Jong-Wook Lee • plazi • Guido Sautter

DATASET TAXONOMY METRICS ACTIVITY DOWNLOAD HOME PAGE

162 MATERIALS EXAMINED 15 RECORDS 6 CITATIONS

This dataset contains the digitized treatments in Plazi based on the original journal article Kim, Chang-Jun, Notton, David G., Ødegaard, Frode, Lee, Jong-Wook (2018): Review of the Palaearctic species of Ismaridae Thomson, 1858 (Hymenoptera: Diaprioidea). European Journal of Taxonomy 417: 1-38, DOI: <https://doi.org/10.5852/ejt.2018.417>

Metadata last modified: October 29, 2019
Hosted by: [Plazi.org taxonomic treatments database](#)
License: CC0 1.0
How to cite [DOI](#) [10.5852/ejt.2018.417](https://doi.org/10.5852/ejt.2018.417)

162 Occurrences	100% With taxon match	39% With coordinates	95% With year
15 Accepted names	0 Synonyms	100% Overlap with GBIF Backbone	23% Overlap with Catalogue of Life

63 GEOREFERENCED RECORDS



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Any year 1918 - 2016

EXPLORE

PLAZI
TAKING CARE OF FREEDOM
Data liberation



SOURCES OF DATA IN GBIF: CITIZEN SCIENCE OBSERVATIONS

eBird

iNaturalist

ARTSDATABANKEN

EOD - eBird Observation Data
Published by Cornell Lab of Ornithology
Tim Leatlich • Shawn Ligocki • Jeff Gerbrae

705,008,469 Occurrences
100% With taxon match
99.9% With coordinates

704,979,091 GEOREFERENCED RECORDS

Generated 2 days ago © OpenStreetMap contributors, © OpenMapTiles, © Mapbox

Any year 1800 - 2019

Description
eBird is a collective enterprise that takes a novel approach to citizen science by developing cooperative partnerships among experts in a wide range of fields: population ecologists, conservation biologists, quantitative ecologists, statisticians, computer scientists, GIS and informatics specialists, application developers, and data administrators. Managed by the Cornell Lab of Ornithology eBird's goal is to increase data quantity through participant recruitment and engagement globally, but also to quantify and control for data quality issues such as observer variability, imperfect detection of species, and both spatial and temporal bias in data collection. eBird data are openly available and used by a broad spectrum of students, teachers, scientists, NGOs, government agencies, land managers, and policy makers. The result is that eBird has become a major source of biodiversity data, increasing our knowledge of the dynamics of species distributions, and having a direct impact on the conservation of birds and their habitats.

iNaturalist Search Explore Your Observations Community

Places > Asia (Continent) > Find a place

Pakistan Country

1042 of 2103 confirmed

Search for Species Search Establishment Threatened

Serinus pusillus (Fire-fronted Serin)
Carpodacus erythrinus (Rosenfink)
Emberiza cia (Rock Bunting)

Carpodacus rhodochlamys (Red-mantled Rosefinch)
Aythya ferina (Taffeland)
Anas platyrhynchos (Stokkand)

- Chordates
 - Vertebrates
 - Ray-finned fishes
 - Amphibians
 - Birds
 - Mammals
 - Reptiles

Norwegian Species Observation Service
Published by The Norwegian Biodiversity Information Centre (NBIC)
The Norwegian Biodiversity Information Centre

23,674,790 Occurrences
99.9% With coordinates
99.9% With year

23,674,776 GEOREFERENCED RECORDS

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Any year 1715 - 2020

860,229 OCCURRENCES WITH IMAGES

International crowd-sourcing portals

National crowd-sourcing portals

SOURCES OF DATA IN GBIF: DNA SEQUENCE-DERIVED OCCURRENCE DATA

Get data | How-to | Tools | Community | About

SAMPLING EVENT | REGISTERED MARCH 7, 2019

Atlantic salmon microbiota

Published by [MGnify](#)

DATASET | METRICS | ACTIVITY | DOWNLOAD

4,702 OCCURRENCES | 4 CITATIONS

Atlantic salmon skin mucus and surrounding water have been sampled at production facilities both in freshwater and after transfer to seawater. Extracted DNA is sequenced using barcoded 16S primers using PacBio SCC.

Metadata last modified: March 13, 2019
Hosted by: GBIF Secretariat
License: CC BY 4.0
How to cite: DOI 10.15468/ox86z5

4,702 Occurrences | 94% With taxon match | 100% With coordinates | 100% With year

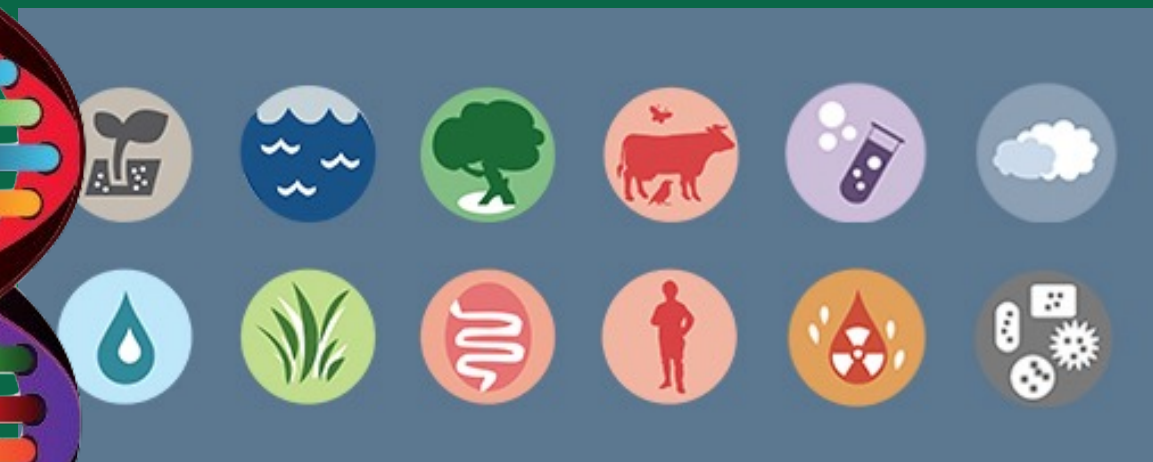
4,702 GEOREFERENCED RECORDS

Generated 2 hours ago © OpenStreetMap contributors, © OpenMapTiles, GBIF

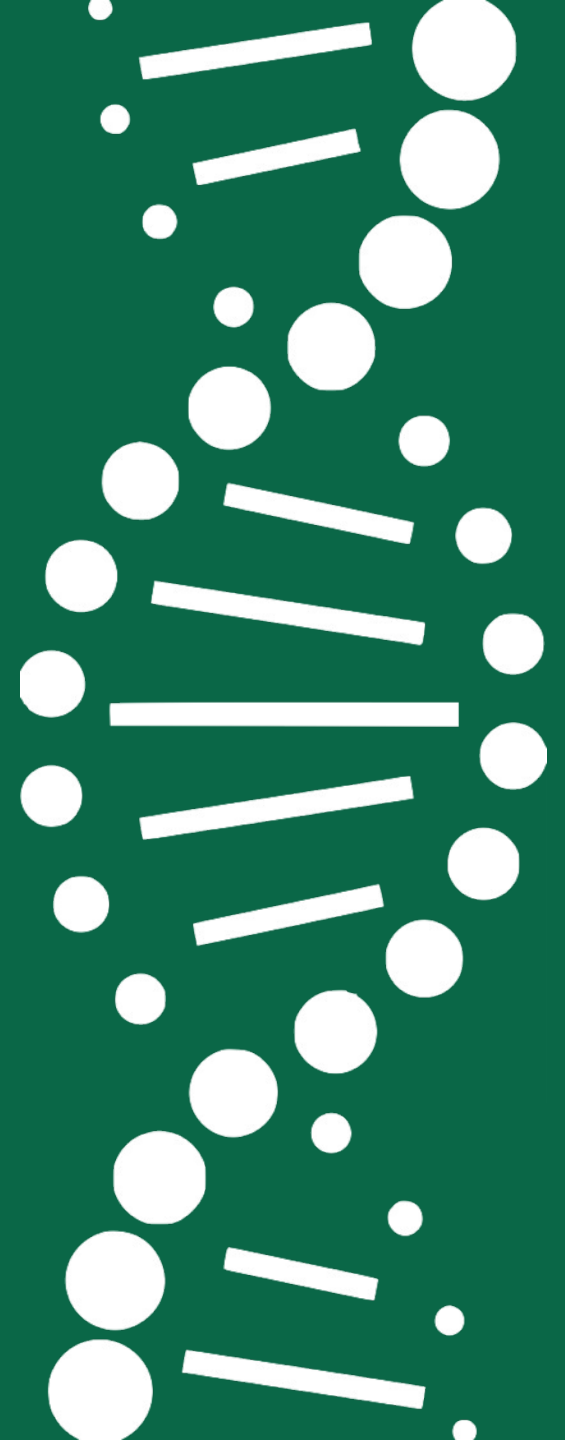
Year 2017 | EXPLORE AREA

66 EVENTS

Event ID	Event date	Sampling protocol	Occurrence count
mgysa00210126	1 January 2017		297
mgysa00210073	1 January 2017		209
mgysa00210106	1 January 2017		203



molecular DNA data



NEW GBIF GUIDE: PUBLISHING SEQUENCE-DERIVED DATA THROUGH BIODIVERSITY DISCOVERY PLATFORMS

- Authors from Australia, **Norway**, Sweden, Denmark, UNITE, and GBIFS
 - Based on practical mapping and data publishing experiences
 - Cross-platform
 - About 40 pages long "cookbook"
 - ❖ **Introduction** – refresh your "data culinary" knowledge
 - ❖ **Categorization** – what "data ingredients" you got to publish?
 - ❖ **Mapping** – choose and follow the "recipe"
 - ❖ **Visuals** – clarity and guidelines
 - ❖ Future prospects
 - ❖ Resources: glossary, links, references
- Based on **Darwin Core** and **MIxS** data standards

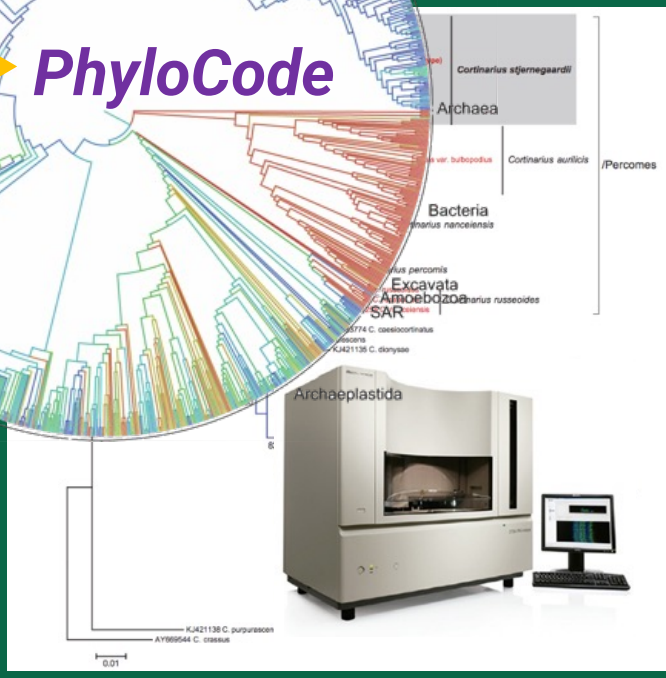
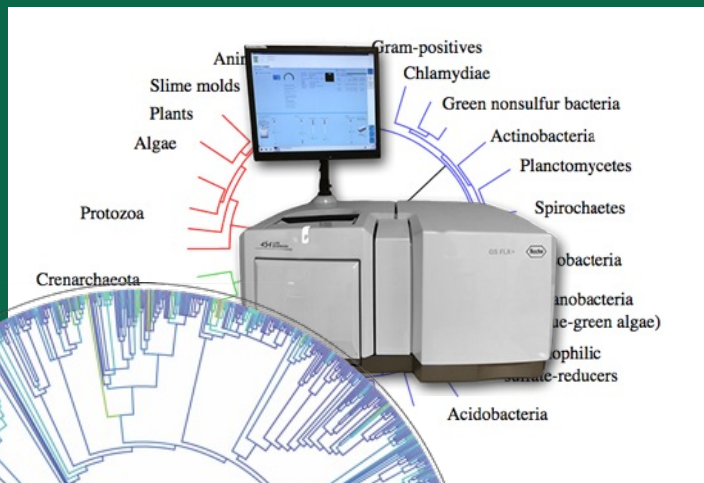
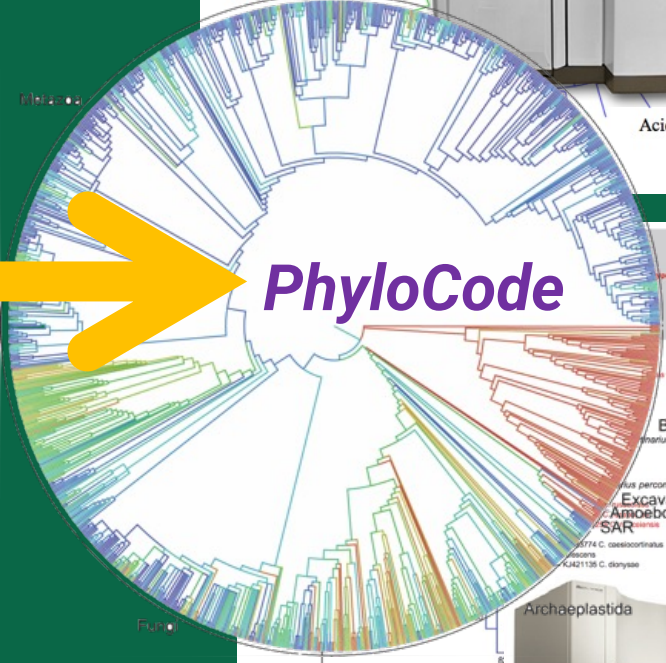
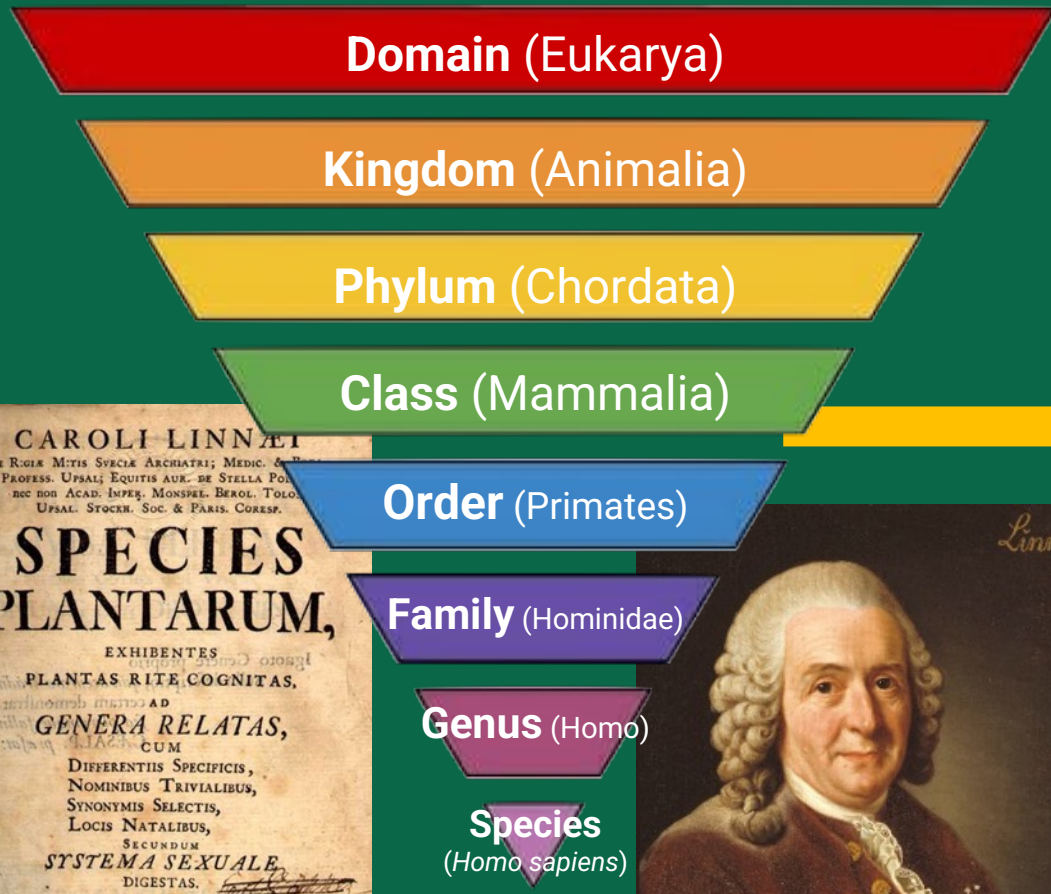
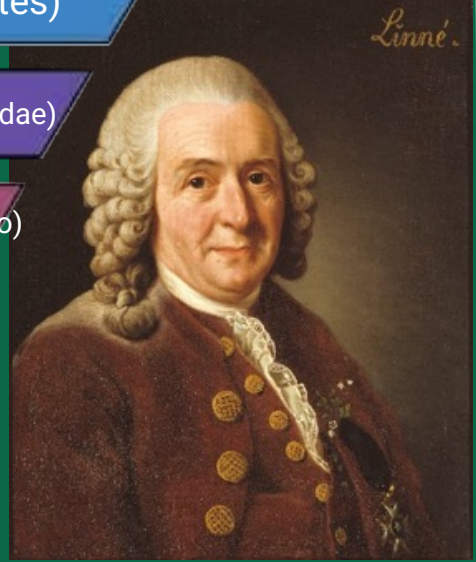
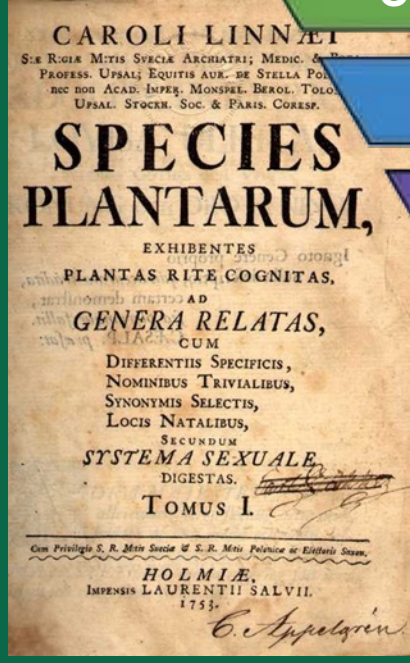
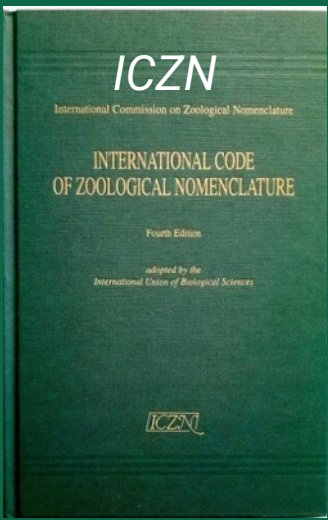
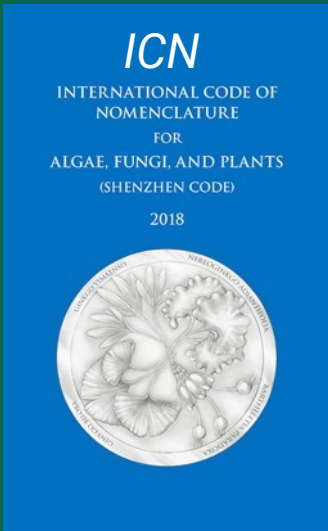
Publishing DNA-derived data through biodiversity data platforms

Anders F. Andersson · Andrew Bissett · Anders G. Finstad · Frode Fossøy · Marie Grosjean · Michael Hope · Thomas S. Jeppesen · Urmas Kõljalg · Daniel Lundin · R. Henrik Nilsson · Maria Prager · Cecilie Svenningsen · Dmitry Schigel – Version 3027b16, 2022-08-05 14:26:56 UTC

This document is also available in [PDF format](#) and in other languages: [français](#).



LATIN NAMES ARE RULED BY THE CODES



From codes to OTUs (operational taxonomic units)





Species

DNA

Barcode



GBIF
backbone
taxonomy

SH ABC0001

A screenshot of the Species 2000 website for the species *Tomentella atroarenicolor* Nikol. The page shows a classification tree on the left with 'Tomentella Pers. ex Pat.' highlighted. The main content area includes a title, publication information, a map of Europe with occurrence points, and a list of de-referenced records. A blue box highlights the 'Tomentella Pers. ex Pat.' entry in the classification tree.

OTU = Operational Taxonomic Unit



OTU = SH
Species
hypothesis
numbers [DOI]



BIN DEF0002

A screenshot of the Barcode of Life website for the species *Macrocheraia grandis*. The page shows a classification tree on the left with 'Macrocheraia Guérin-Ménéville, 1829-1838' highlighted. The main content area includes a title, source information, a map of India with occurrence points, and a list of de-referenced records. A blue box highlights the 'Macrocheraia grandis' entry in the classification tree.



OTU = BIN
Barcode
identification
number

Catalogue of Life



- **The most complete authoritative list of the world's species** - maintained by hundreds of global taxonomists - probably includes just over **80% of the world's known species.**

- CoL 2022-10-20 [doi:10.48580/d4t2](https://doi.org/10.48580/d4t2) (approx. 2,3 M accepted species names)
- CoL available in GBIF at [doi:10.15468/rffz4x](https://doi.org/10.15468/rffz4x) (4,7 M names, incl. synonyms)



species  2000



alliance for biodiversity knowledge

WoRMS

World Register of Marine Species

World Register of Marine Species (WoRMS) provide an authoritative and comprehensive list of names of marine organisms

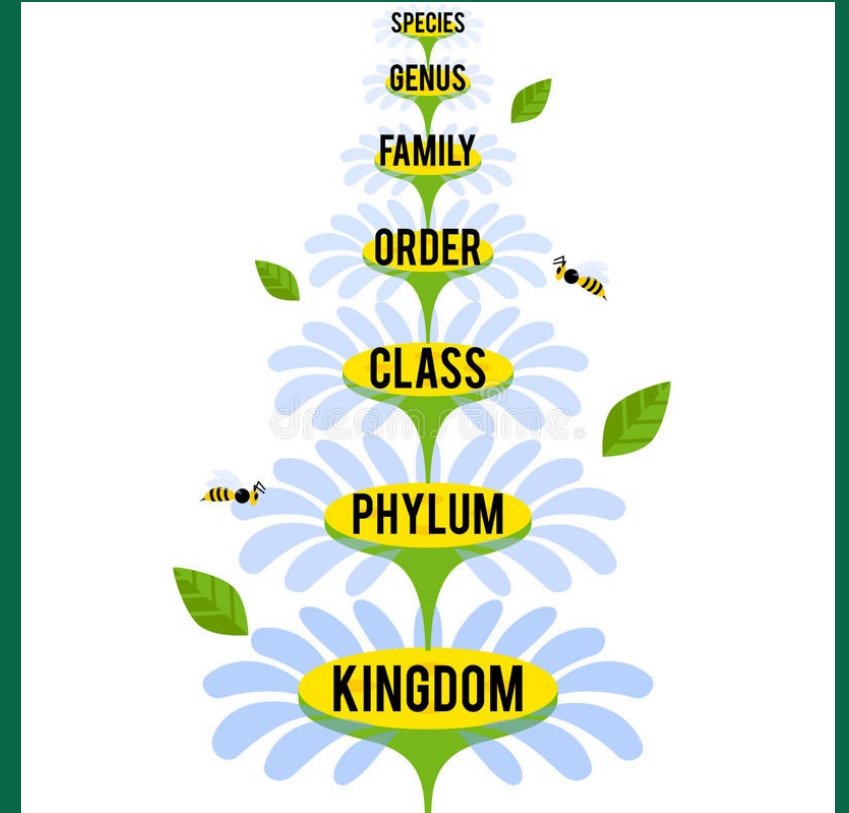
- WoRMS 2022-11-07 (241 387 accepted species names; 599 878 names)
- WoRMS available in GBIF at [doi:10.14284/170](https://doi.org/10.14284/170) (719 524 accepted names)





ChecklistBank

- The Catalogue of Life (COL) support the publication and curation of checklists and provide a platform for their consistent discovery, use and citation.
- The taxonomic community can publish a checklist to ChecklistBank.
- ChecklistBank generates a standardised interpretation, and all datasets can be accessed via the ChecklistBank API.



Catalogue of Life





GBIF

data publishing



PUBLISH YOUR DATASETS WITH GBIF

- *Step 1:* digitize collections & herbaria
- *Step 2:* register for endorsement in GBIF
- *Step 3:* convert to Darwin Core format
- *Step 4:* publish from national GBIF node

- *Alternative:* publish from regional GBIF cloud data repository - cloud.gbif.org/eca
- *Alternative:* Many citizen science data platforms publish data in GBIF





GBIF

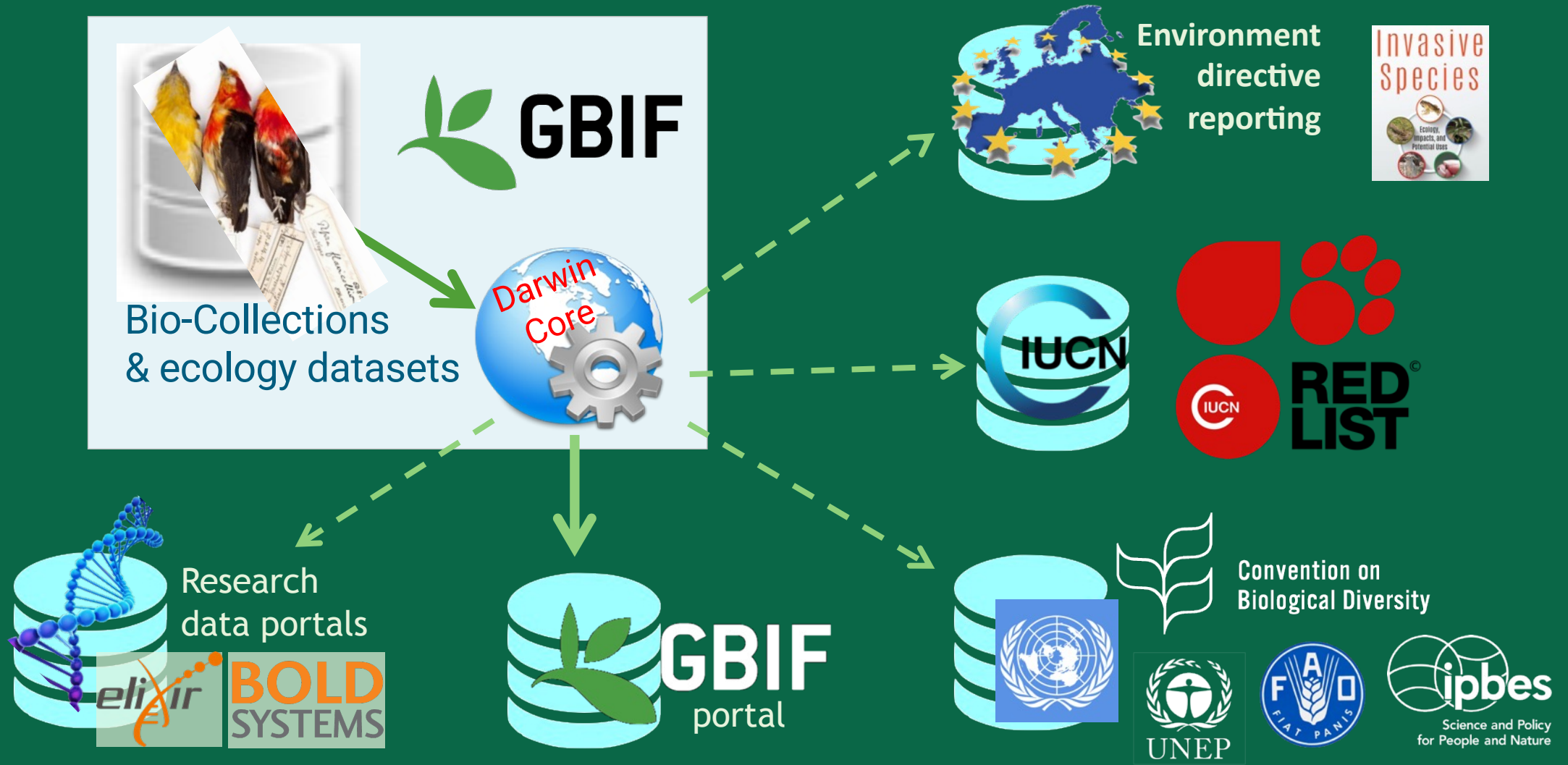
data use



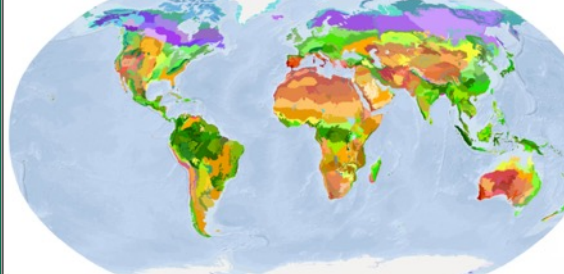
GBIF IS A "FAIR" & OPEN BIODIVERSITY DATA INFRASTRUCTURE



GBIF: MULTIPLE-PURPOSE DATA PUBLISHING SERVICES



A DATA RESOURCE TO SUPPORT RESEARCH AND SUSTAINABLE DEVELOPMENT



SERVED AS THE BASIS OF THE STATISTICAL ANALYSIS IN SMITH ET AL. 2018, THE LATEST EXPERT-LED REFINEMENT OF A GLOBAL MAP OF ECOREGIONS DEVELOPED AS PART OF THE PROPOSED GLOBAL DEAL FOR NATURE HAD ITS APPROACH VALIDATED BY THE RESEARCH. FIGURE FROM DINERSTEIN ET AL. (2017) | [HTTPS://DOI.ORG/10.1093/BIOSCI/BIX014](https://doi.org/10.1093/biosci/bix014) [CC BY 4.0]

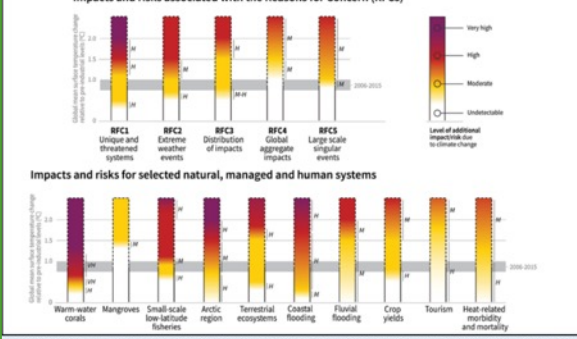
DATA STORY USING SPECIES OCCURRENCE DATA AS EVIDENCE TO TEST RECEIVED BIOGEOGRAPHIC WISDOM

DATA USED: 200 MILLION SPECIES OCCURRENCES



COFFEA LIBERICA BY DINESH VALKE [HTTPS://WWW.FLICKR.COM/PHOTOS/DINESH_VALKE/5597839545](https://www.flickr.com/photos/dinesh_valke/5597839545) [CC BY-SA 2.0]

DATA STORY DEVELOPING AN INDICATOR FOR SUSTAINABLE DEVELOPMENT GOALS & BIODIVERSITY TARGETS USING OPEN DATA



Impacts and risks associated with the reasons for concern (RFCs)

Impacts and risks for selected natural, managed and human systems

IMPLICATIONS OF GLOBAL WARMING FOR PEOPLE, ECONOMIES AND ECOSYSTEMS. CROPPED FROM FIGURE IN IPCC SR1.5: SUMMARY FOR POLICYMAKERS*

DATA STORY DATA FROM THE GBIF NETWORK UNDERPINS BIODIVERSITY-RELATED FINDINGS IN LATEST IPCC REPORT



PTEROPUS GIGANTEUS BY HEMANT KUMAR [HTTPS://WWW.GBIF.ORG/OCCURRENCE/1092888502](https://www.gbif.org/occurrence/1092888502) [CC BY-NC 4.0]

DATA STORY FLYING FOXES PREDICT NIPAH VIRUS TRANSMISSION RISK

DATA USED: 47,942 SPECIES OCCURRENCES

Conservation

- Protected areas
- Threatened species
- Invasive species risk

Food Security

- Crop wild relatives
- *In situ, ex situ* conservation of genetic diversity
- Fisheries planning

Climate change

- Modelling impacts on species ranges
- Adaptation strategies
- Mitigation benefits, risks

Human health

- Disease risk based on occurrence of vectors, hosts, reservoirs
- Medicinal plants
- Hazards e.g. snakebite

POLICY LINKS: AICHI TARGETSUPPORTING BIODIVERSITY INDICATORS



- Trend in invasive alien species introductions (through Global Register of Introduced and Invasive Species)



- Species Protection Index
- Protected Area Representativeness Index



- Comprehensiveness of conservation of socioeconomically/culturally valuable species
- Agrobiodiversity Index
- Crop Wild Relative Index



- Growth in species occurrence records accessible through GBIF
- Species Status Information Index

POLICY LINKS



Convention on
Biological Diversity



SUSTAINABLE
DEVELOPMENT
GOALS

COUNTRY PROFILES

Norway



Norway

Convention

Party since: 1993-12-29

By: Ratification

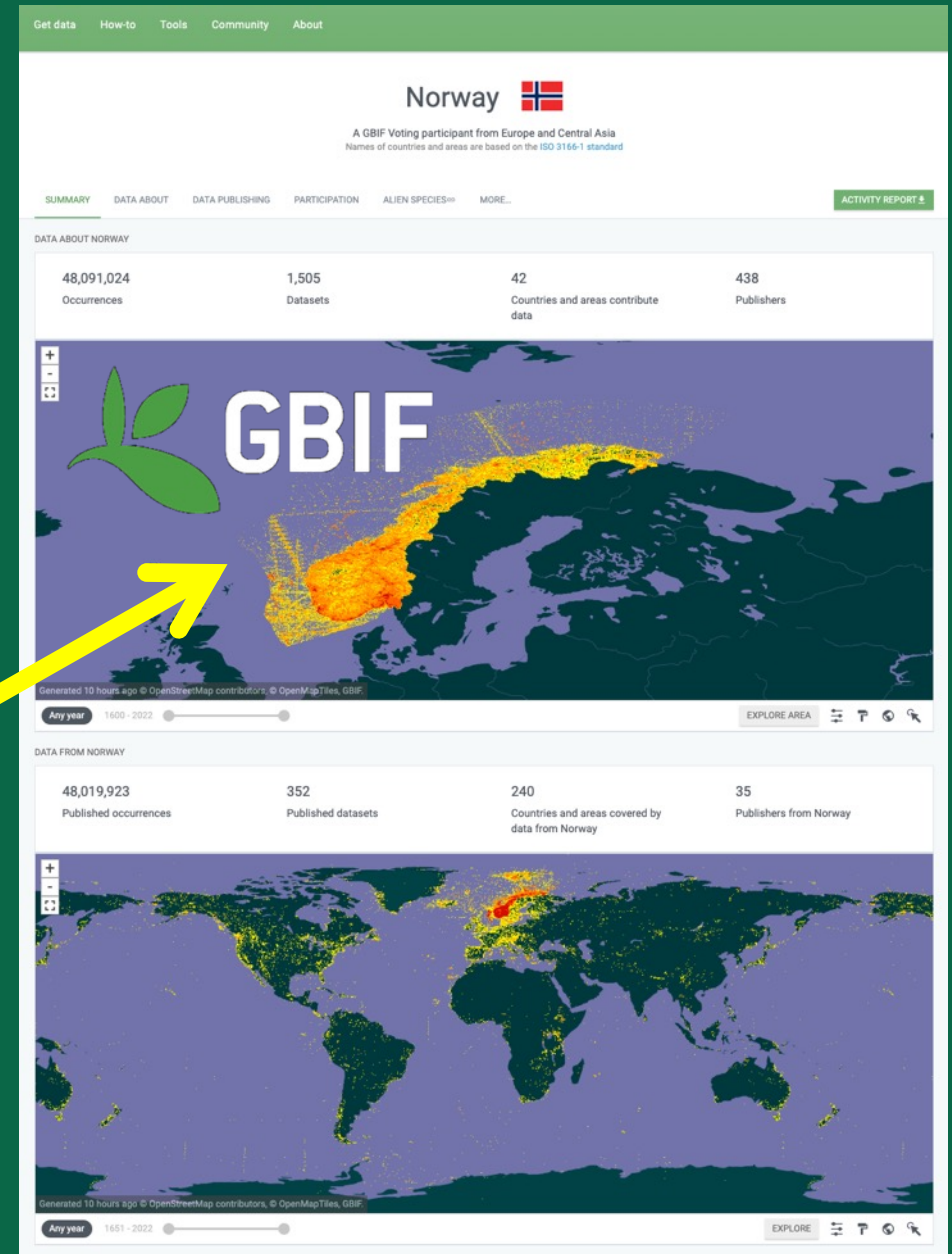
Cartagena Protocol

Party since: 2003-09-11

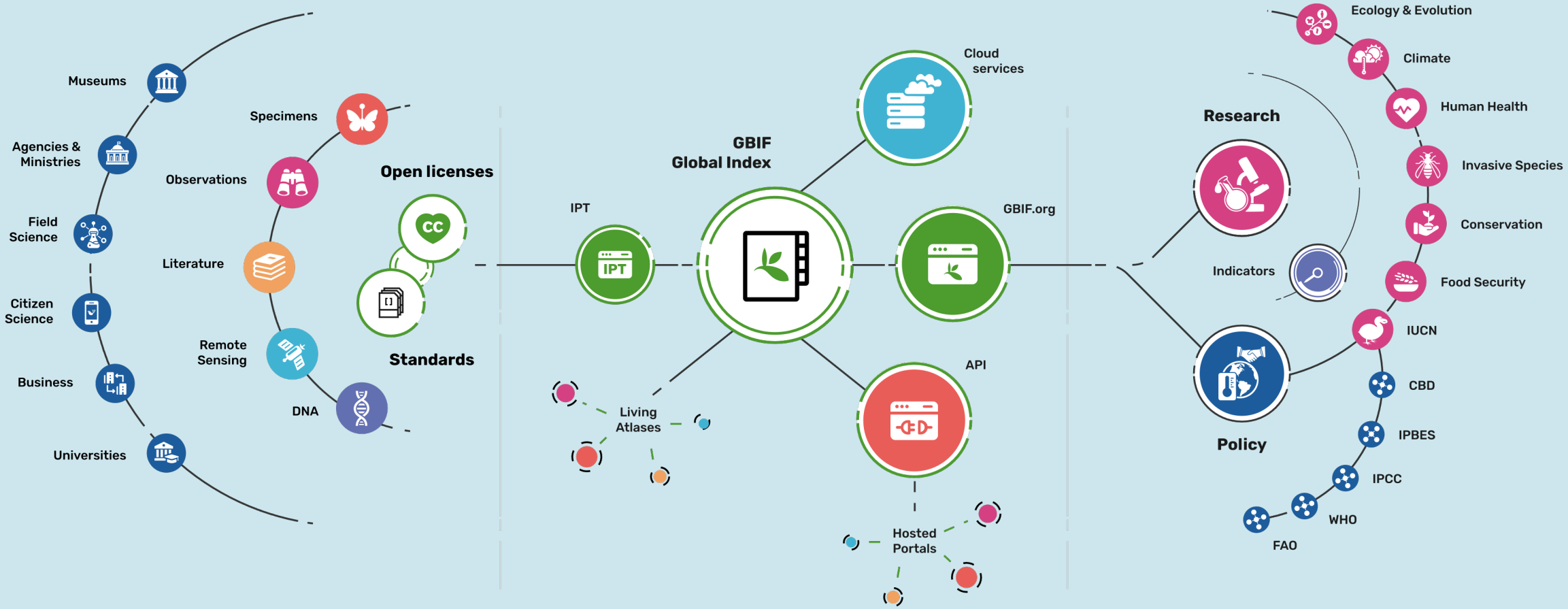
By: Ratification

Further Information

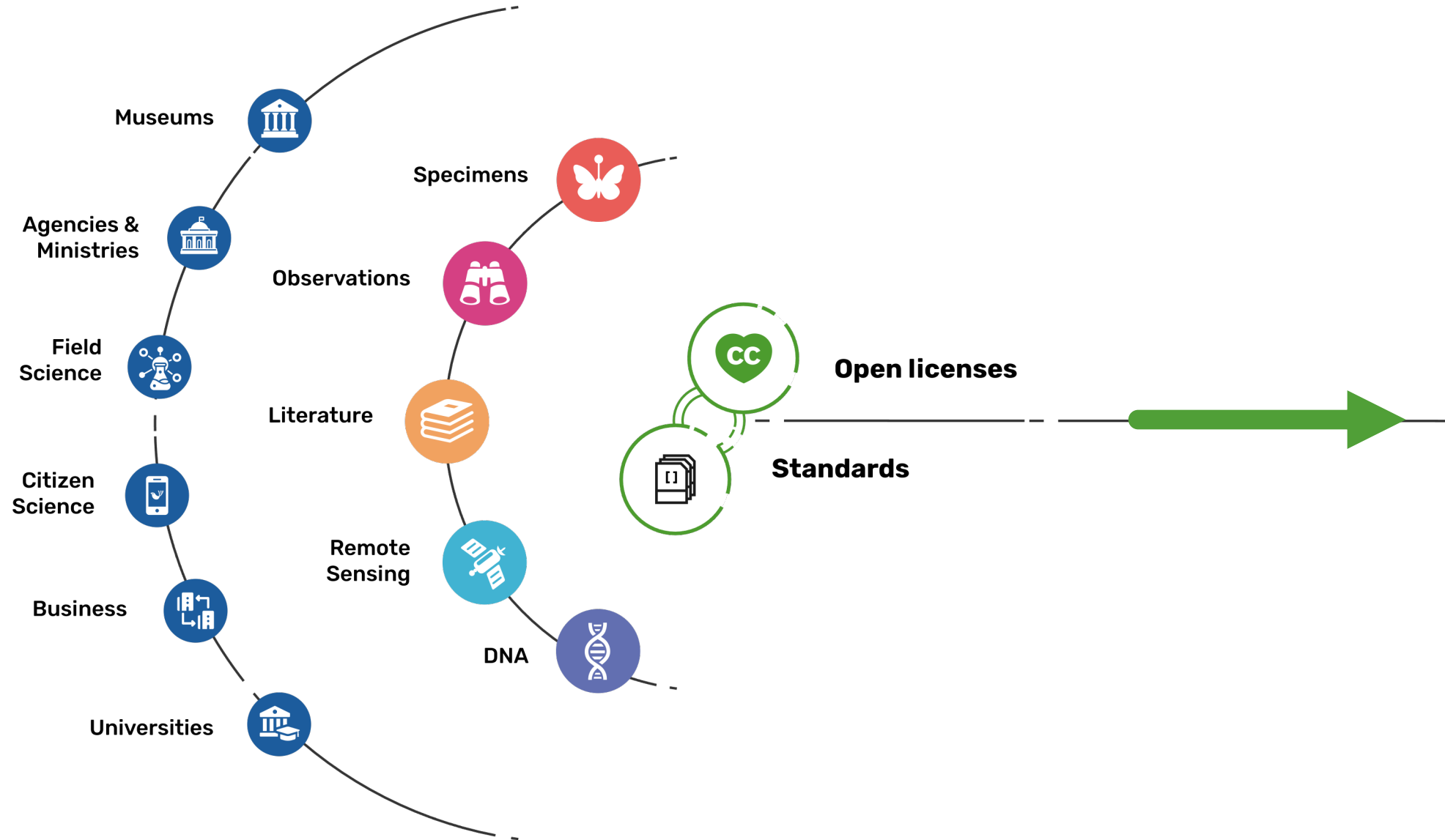
- > InforMEA Profile
- > World Heritage Sites
- > GBIF Data
- > WTO Statistics
- > Law and Environment
- > Invasive Alien Species
- > Related Websites



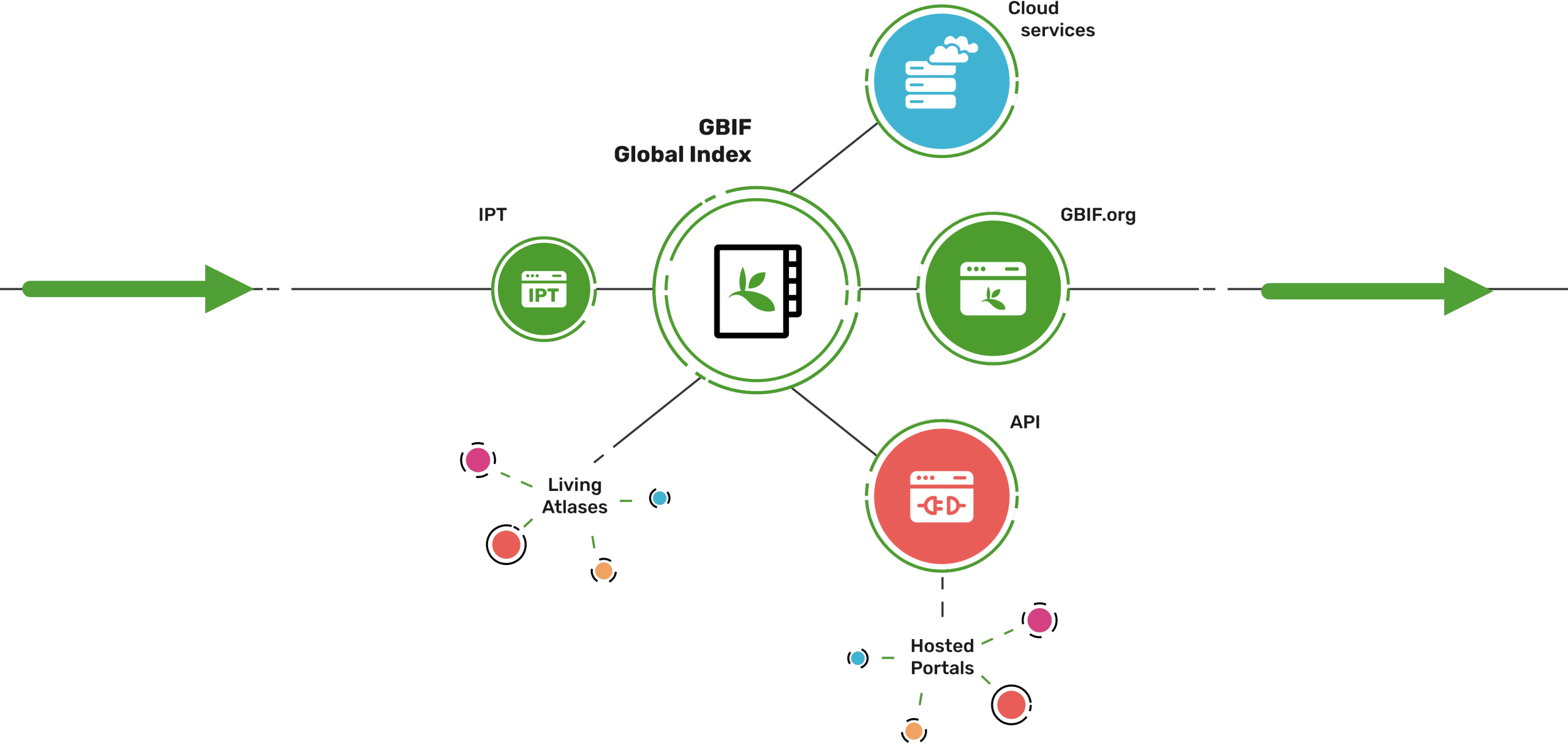
PROVIDING BIODIVERSITY EVIDENCE FOR RESEARCH AND POLICY



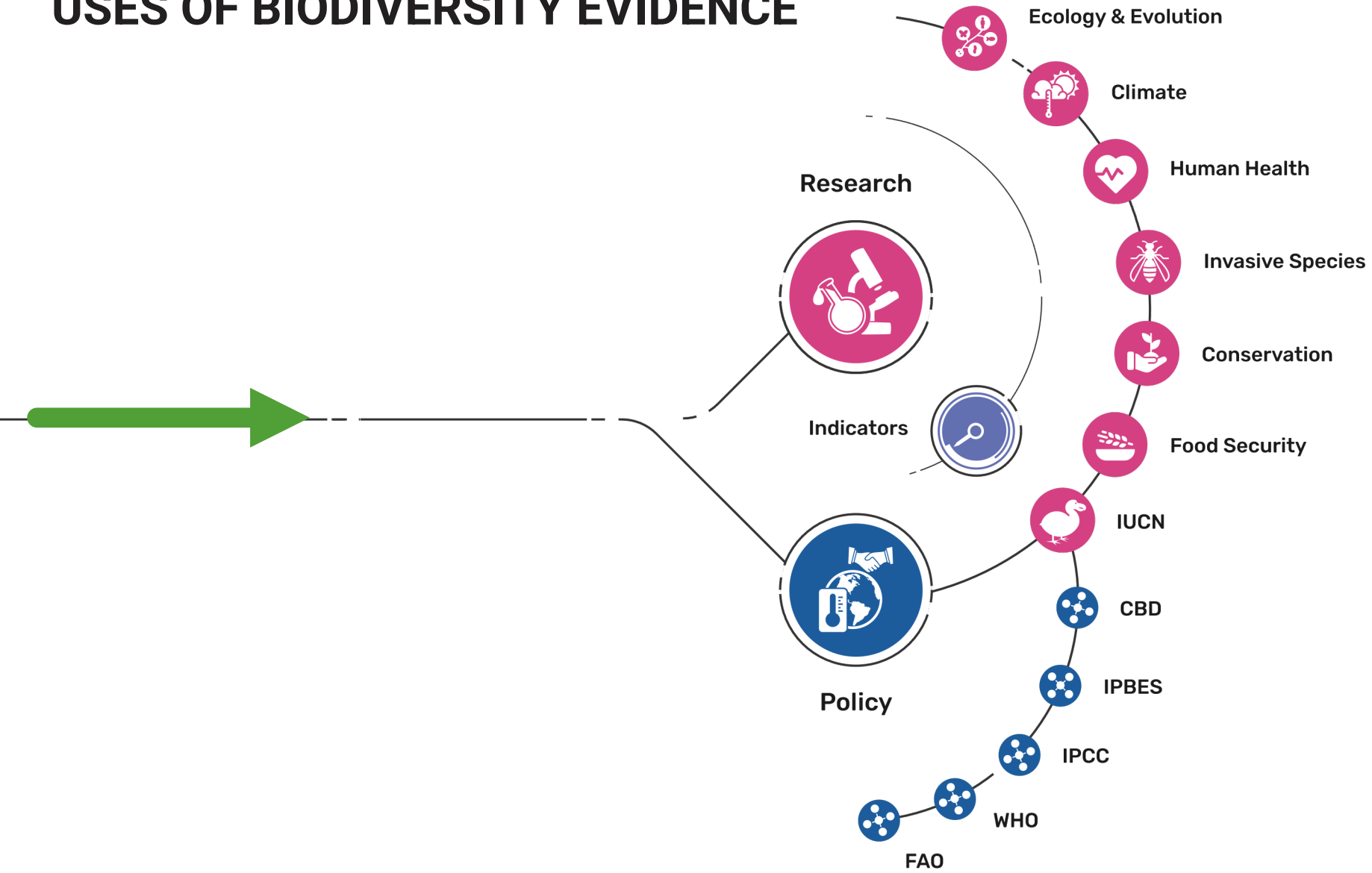
SOURCES OF BIODIVERSITY EVIDENCE



ACCESS TO BIODIVERSITY EVIDENCE



USES OF BIODIVERSITY EVIDENCE



THANK YOU

GBIF Norway

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