

PARAQUA

Parasites database: how it started vs how it's going

Andrea Tarallo
WG1 co-leader

ParAqua “Writing Retreat” Workshop
29-31 January 2024, Lyon (France)

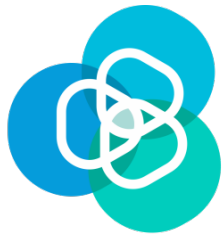


Funded by
the European Union



Program

9:00-10:30	The database tale, from the beginning to now
	An overview on the data collected and next steps
	How to use the template for in situ data
	Hands-on session
10:30-11:00	Coffee break
11:00-12:00	Discussion on database structure and layout for the graphical interface

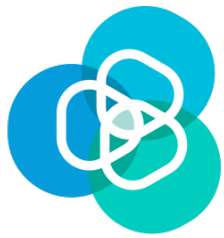


how it started

“The WG(1) will first implement an **online Observatory as interactive platform** using questionnaires and open web applications with the [...] aims (among other) of [...] **survey and summarize all the currently available information on zoosporic parasites occurrence, diversity, biogeography, [...].**

Complementary to WG1, WG2 [...] aims to assemble and integrate all available information on the **ecology and functional traits of zoosporic parasites into an occurrence database**. The database will then allow the **evaluation** of which environmental conditions promote or suppress infections by zoosporic parasites. [...]

(WG2) Task: **Complete the online catalogue (WG1) with ecological and functional traits** of zoosporic parasites by tallying available **data on biotic and abiotic environmental drivers of infection, virulence and host sensitivity in natural and industrial systems [...].**

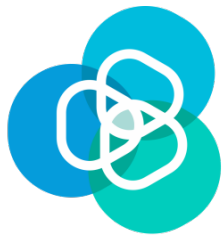


Original deliverable

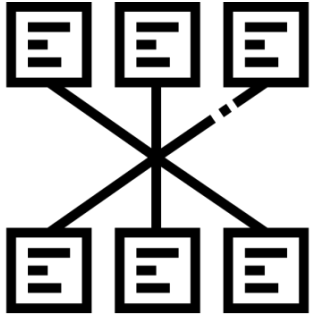
D2.1 Interactive web page and on-line catalogue with the data collected from the Observatory and with an interactive blog that will be kept updated regularly with the opportunity to integrate info and interactive sharing of information by the users.

What were the needs of ParAqua?

- A centralised gateway for the data
- A tool that people can use to see when/why parasites occur in relation to environmental drivers
- Extensible
- Long-term maintained



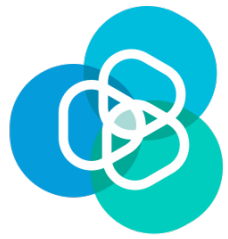
You want a relational database!



Created by Nord Icons
from Noun Project

- A centralised gateway for the data: **all data are stored in a single place**
- A tool that people can use to see when parasites occur in relation to environmental drivers: **the database can be queried and filtered for specific variables or intervals**
- Extensible: **tables can be extended in N of data and in N of variables**
- Long-term maintained: **LifeWatch is long-term maintained** (for at least ten years, and hopefully until I retire)

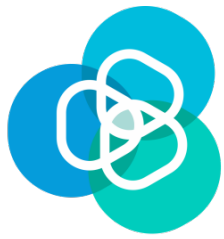
RELATIONAL DATABASE by Nord Icons from
thenounproject.com (CC BY 3.0)



Who is gathering data in ParAqua?



Funded by
the European Union



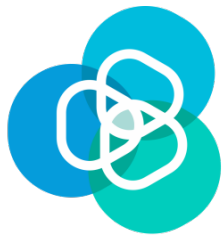
Who is gathering data in ParAqua?

WG1

in situ observations

- Parasite occurrence data
- Associated host(s)
- Parasite traits data
- Accompanying environmental variables

Person to contact:
Andrea Tarallo



Who is gathering data in ParAqua?

WG1

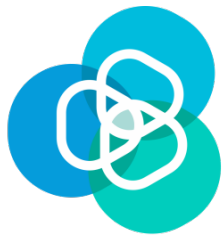
in situ observations

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Data from NCBI

- Parasite genetic seq. data
- Associated host(s)
- Other accessory data

Person to contact:
Albert Reñé



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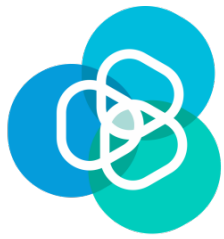
- Parasite genetic seq. data
- Associated host(s)
- Other accessory data

WG2

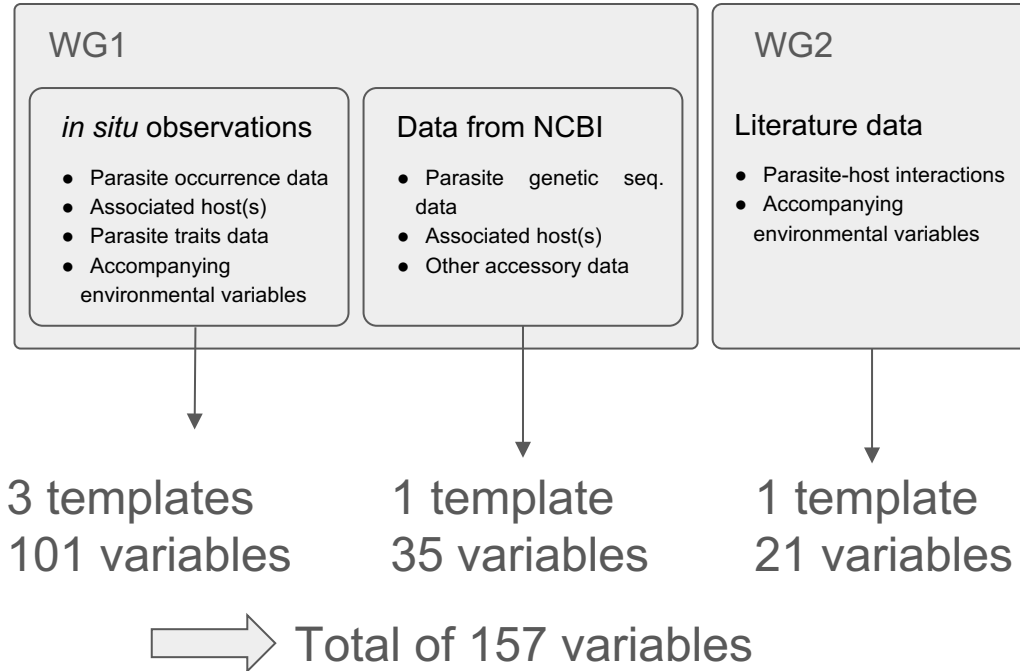
Literature data

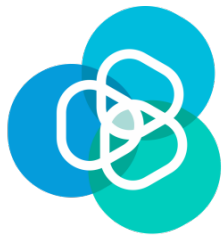
- Parasite-host interactions
- Accompanying environmental variables

Person to contact:
Blagoy Uzunov

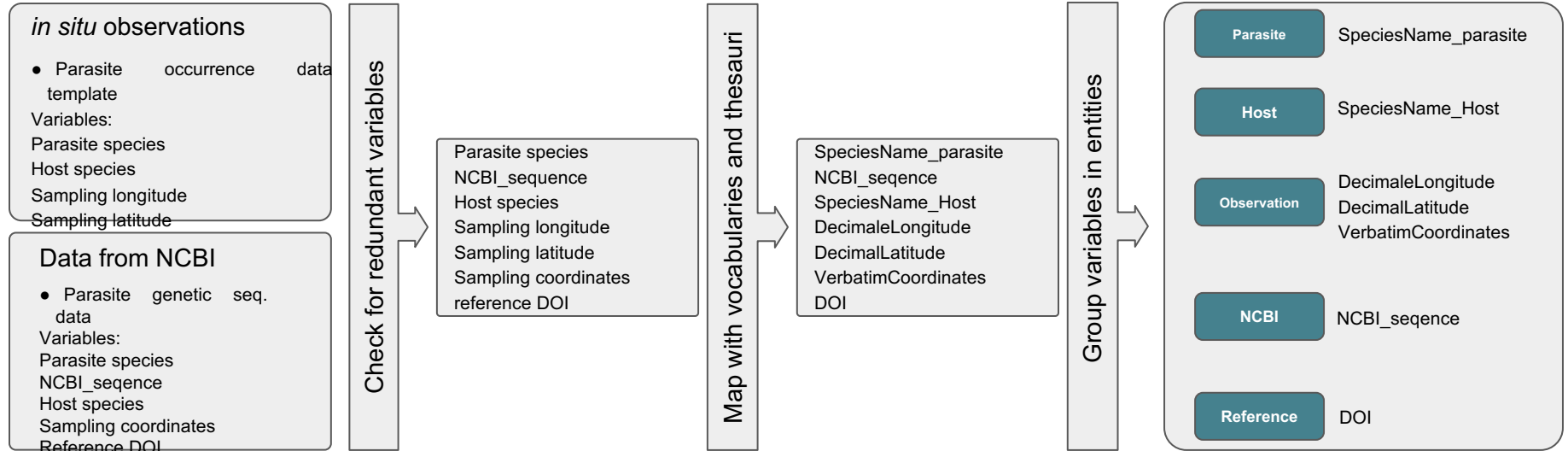


Who is gathering data in ParAqua?

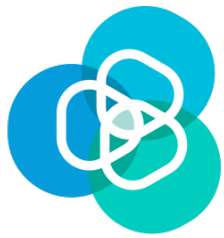




How we organised the job*



*VMG Giuseppe Turrisi



How we organised the job

- We cut down from 157 to **110**
- (plus about 30 for full taxonomy)

in situ observations

• Parasite occurrence data
template

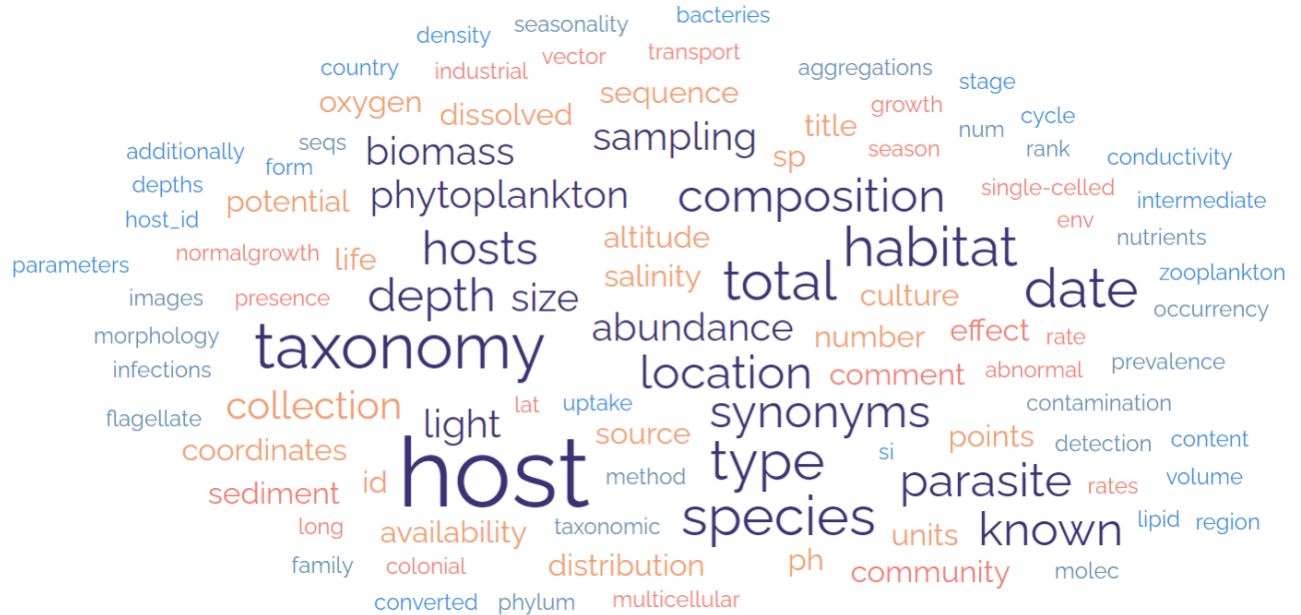
Variables:
Parasite species
Host species
Sampling longitude
Sampling latitude

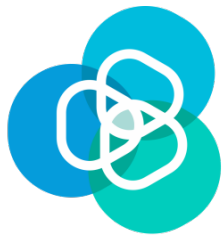
Data from NCBI

• Parasite genetic seq.
data

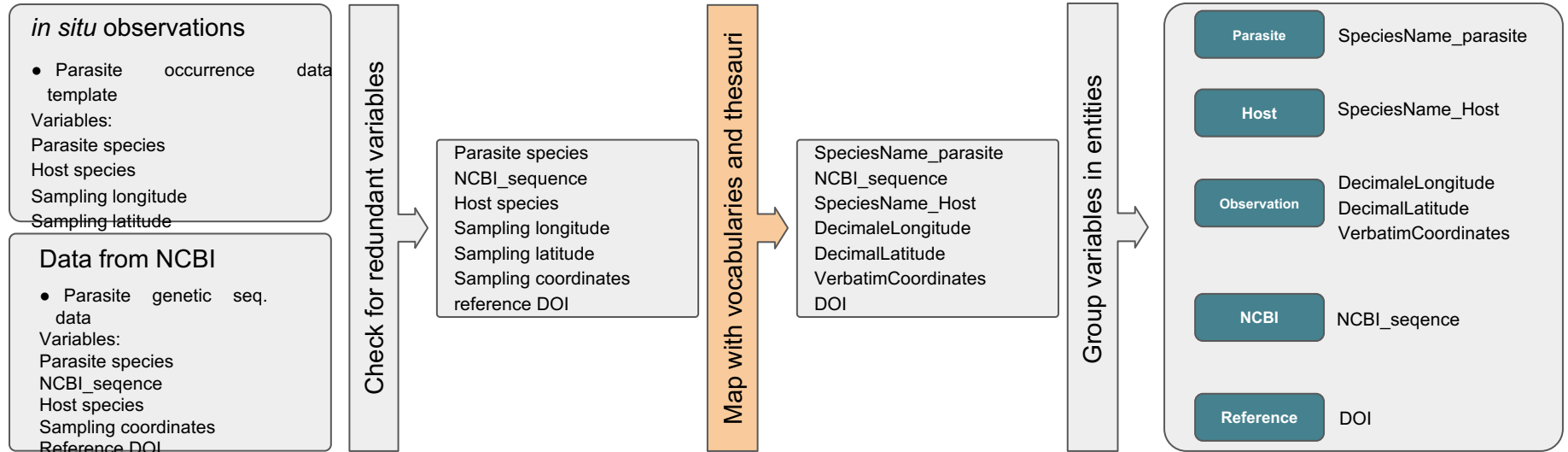
Variables:
Parasite species
NCBI_sequence
Host species
Sampling coordinates
Reference DOI

Check for redundant variables





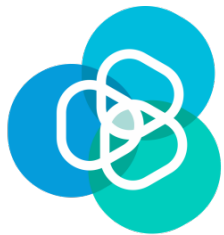
How we organised the job



157
redundant/unclear
variables

110 unique variables
+30 for taxonomy





How we organised the job

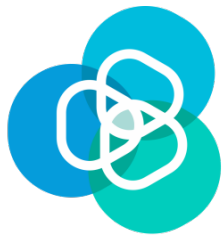
Parasite species
NCBI_sequence
Host species
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Map with vocabularies and thesauri

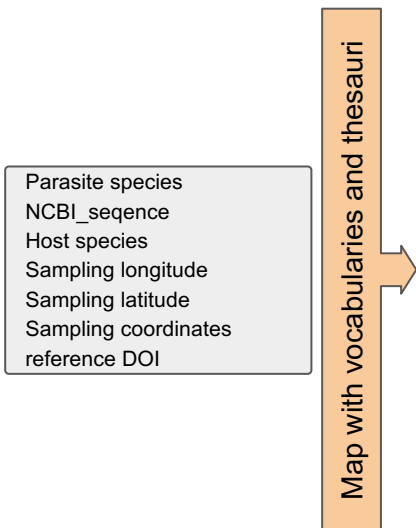


Vocabularies and thesauri are **semantic artefacts**: machine-readable, machine-interpretable and machine-actionable **formalisations of concepts** that can be used and exchanged to encode and decode information in a predictable way, thus **enabling the discovery, integration and reuse of information by both humans and machines**

Le Franc et al., 2022. <https://zenodo.org/records/6675295>

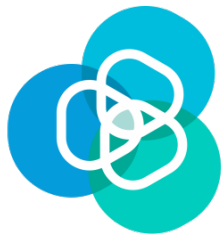


How we organised the job

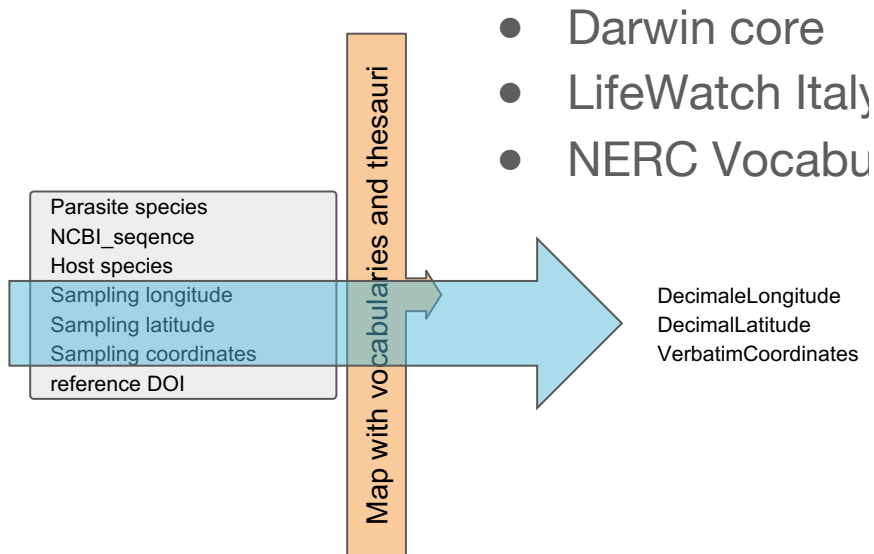


- Darwin core
- LifeWatch Italy thesauri
- NERC Vocabulary Server





How we organised the job



Term Name `dwc:decimalLatitude`

Term IRI <http://rs.tdwg.org/dwc/terms/decimalLatitude>

Modified 2023-06-28

Term version IRI <http://rs.tdwg.org/dwc/terms/version/decimalLatitude-2023-06-28>

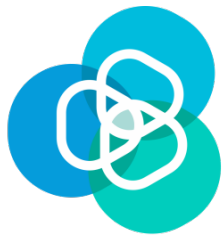
Label Decimal Latitude

Definition The geographic latitude (in decimal degrees, using the spatial reference system given in `dwc:geodeticDatum`) of the geographic center of a `dcterms:Location`. Positive values are north of the Equator, negative values are south of it. Legal values lie between -90 and 90, inclusive.

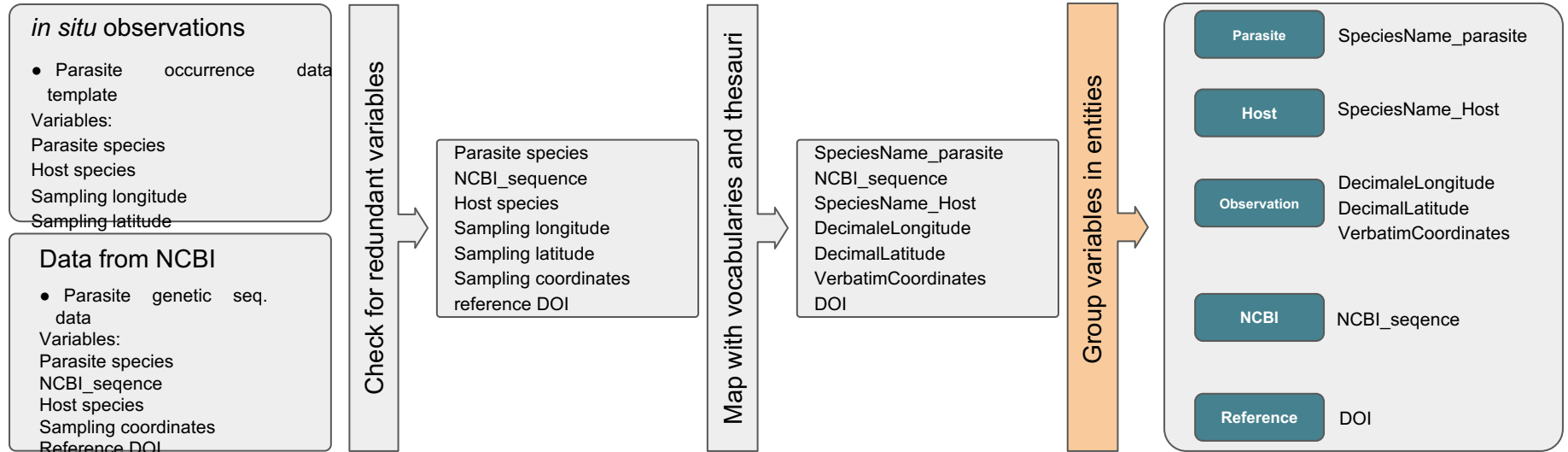
Examples `-41.0983423`

ABCD equivalence `DataSets/DataSet/Units/Unit/Gathering/SiteCoordinateSets/SiteCoordinates/CoordinatesLatLon/Latitude`

Type Property



How we organised the job



157
redundant/unclear
variables

110 unique variables
+30 for taxonomy



Parasite

scientificName_ID*
 scientificName
 kingdom
 Phylum
 class
 ...
 AcceptedNameUsage
 presenceOfFlagella
 behaviour

NCBI

NCBI_ID*
 NCBI_Species
 NCBI_biomol
 NCBI_caption
 NCBI_slen
 NCBI_sequence
 NCBI_host
 verbatimEventDate
 decimalLat
 decimalLong
 Verbatim coordinates
 country
 Verbatim elevation
 verbatim depth
 habitat
 typeMaterial
 strain
 specimenVoucher
 isolate
 clone
 cultureCollection

Host

hostID*
 kingdom
 Phylum
 class
 ...
 AcceptedNameUsage
 comment

Observation

Observation_ID*
 verbatimElevation
 verbatimDepth
 decimalLatitude
 decimalLongitude
 country
 stateProvince
 verbatimEventDate
 verbatimLocality
 Length
 Biovolume
 Body size
 Life stage
 Light absorboption
 Lipid content
 measurementRemarks
 measurementMethod
 hostDensity
 Nutrients uptake
 Effect on the water
 chemistry
 organismQuantity
 organismQuantityType
 Light
 Light attenuation
 Invasive_Alien
 Comment

Environment

Allelopathy
 Ammonia
 Bathymetry
 BOD5
 Chlorophyll a
 Climate driver
 Collection source
 Color
 Conductivity
 Dissolved Oxygen
 Effect of Bacteria
 Effect of phytoplankton/phytoplankton community composition and abundance
 Effect on the host population
 (abnormal growth rate, dead cells, others)
 Habitat
 habitat_description
 Kjeldal
 Macronutrients
 Medium type
 Micronutrients

Synonym

synonymID,
 Synonym_ScientificName

Microzooplankton_macrozooplankton biomass community composition
 Mixing regime
 Nitrate
 Nitrite
 Organic matter
 pH
 Plastics?
 Precipitation
 Salinity
 Secchi depth
 Sediment characteristics

Reference

Reference_ID*
 Title
 Journal
 DOI

Sediment resuspension
 Size of water body
 Temperature
 Total alkalinity
 Total hardness
 Total Nitrogen
 Total phosphorus
 Trophy
 Turbidity
 Type of the water body
 wave heights
 Winds

Author

Author_ID*
 Author_name
 Author_surname
 Author_email
 Author_istitution

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 Size of water body
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 Trophy
 Turbidity
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 Winds

Author

Author_ID*
 Author_name
 Author_surname
 Author_email
 Author_istitution

Potentially never-ending!!!

Parasite

scientificName_ID*
 scientificName
 kingdom
 Phylum
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 ...
 AcceptedNameUsage
 presenceOfFlagella
 behavior

NCBI

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 chemistry
 organismQuantity
 organismQuantityType
 Light
 Light attenuation
 Invasive_Alien
 Comment

Environment

environmentID*
 variable
 value

Synonym

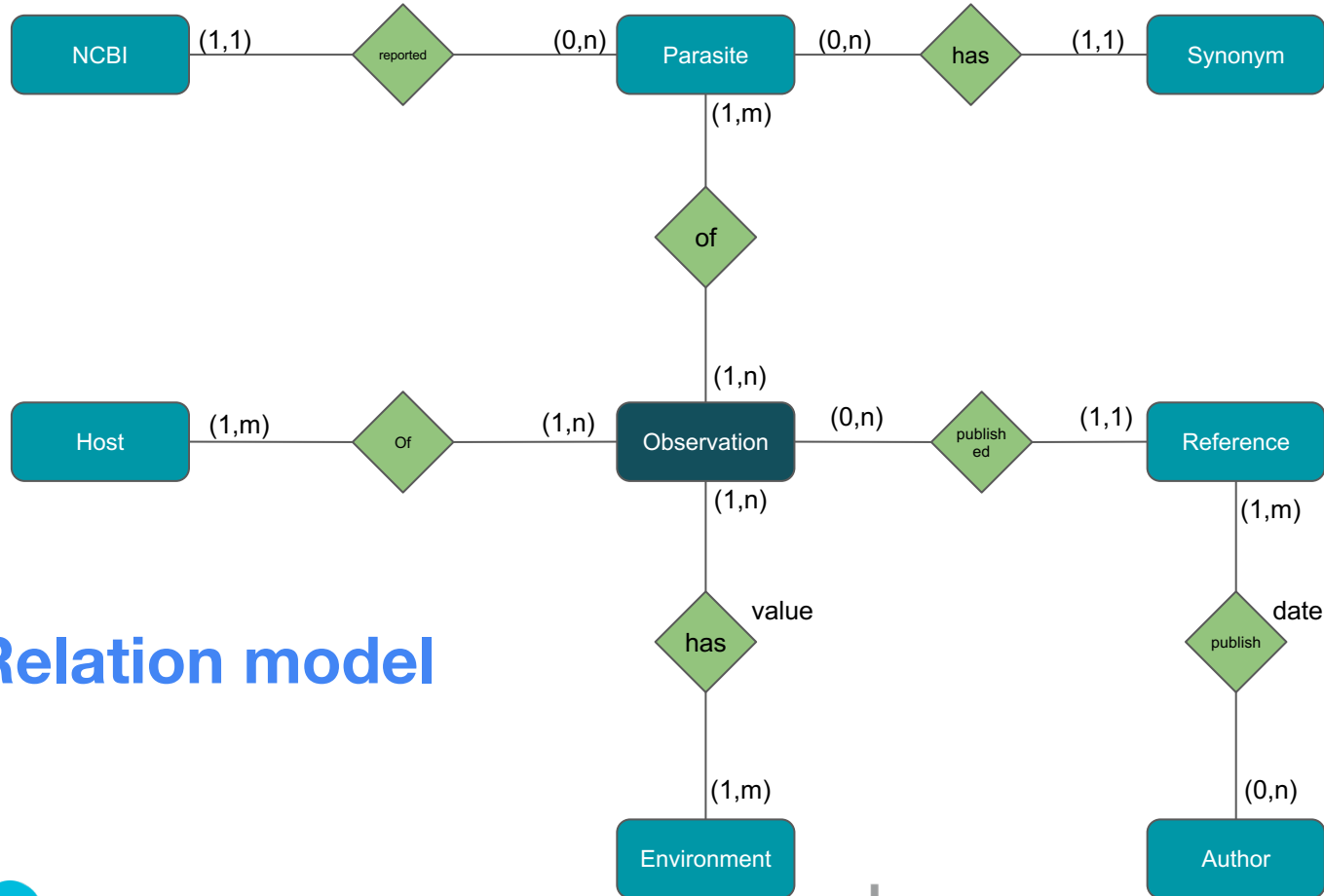
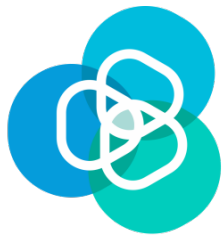
synonymID,
 Synonim_ScientificName

Reference

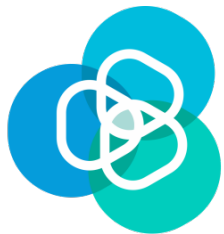
Reference_ID*
 Title
 Journal
 DOI

Author

Author_ID*
 Author_name
 Author_surname
 Author_email
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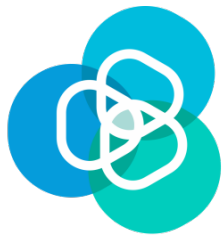


Entity-Relation model

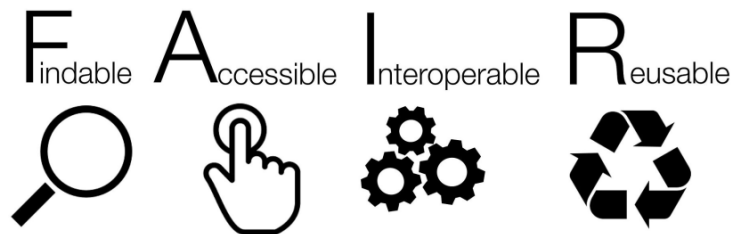


Database relational schema





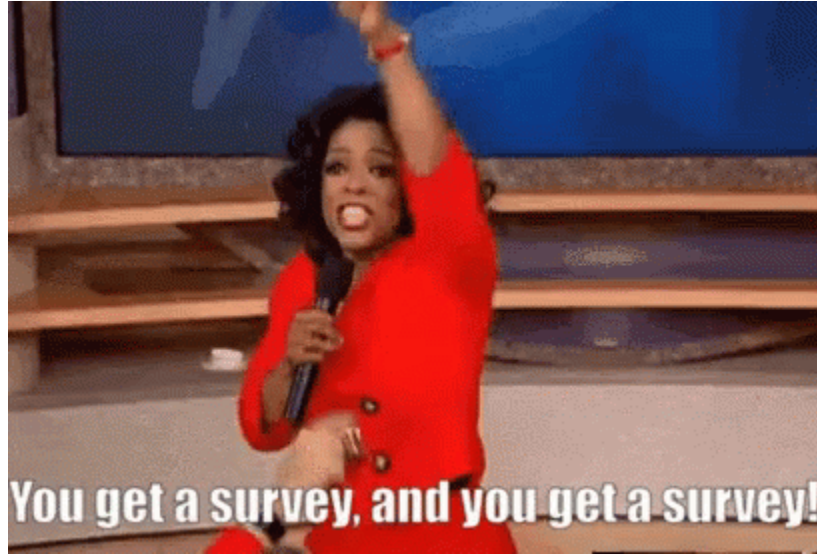
Questions?



CC-by SangyaPundir https://commons.wikimedia.org/wiki/File:FAIR_data_principles.jpg

By UNESCO.org - Understanding open science (p:6) following UNESCO Recommendation on Open Science. Documents available in: Understanding open science CC BY-SA 4.0

I have questions!



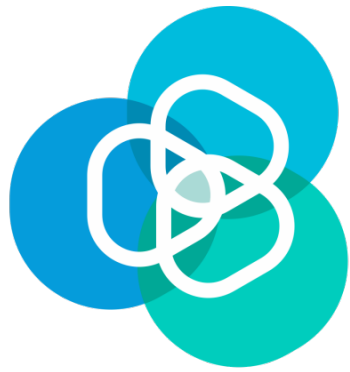
I have questions!

<https://ec.europa.eu/eusurvey/runner/fairsurvey2023>



1 How did you find out about the survey

- Encountered online
- European Venom Network
- Mentioned in a class or workshop
- ParAqua COST Action



Thank you!

andrea.tarallo@cnr.it

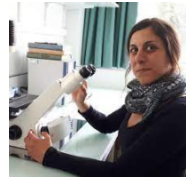
Acknowledgements



Giuseppe Turrisi



Ilaria Rosati

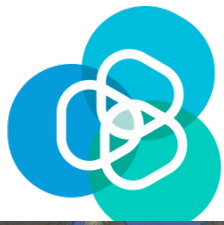


Serena Rasconi



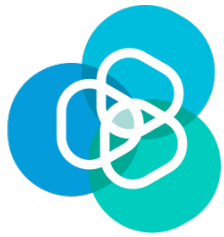
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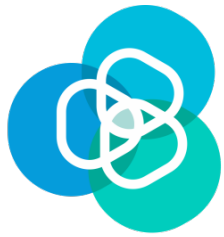
Data distribution for *in situ* observations





Next steps

- How we deal with sp.1, sp.2, sp.n?
- Do we want to make an extra effort to have more complete datasets? (in terms of variables, e.g. water body description? parasite traits? other?)
- Strategy to gather more data
- Strategy to publish the data
- Kick-off the data paper
- Target a journal



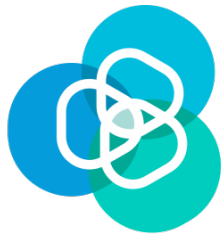
List of taxa

Chytridiales

Parvilucifera sinerae
Parvilucifera corolla
Parvilucifera catillosa
Parvilucifera sp. 3
Eriomyces syringophoreus
Paradinomyces triforaminorum
Dinovorax pyriformis
Maranthos nigrum
Tuberlatum sp.
Dinomyces arenysensis
Dinomyces sp.
Parvilucifera sp.
Rhizophydiales sp.
Parviluciferaceae sp. 1
Parvilucifera sp. 2
Parvilucifera sp. 1
Snorkelia sp.
Parviluciferaceae sp. 2"
Zygophlyctis asterionellae
Zygophlyctidales sp. 1
Zygophlyctidales sp. 2
Zygophlyctis planktonica

Lobulomycetales sp.
Algomyces stechlinensis
Rhizophydiales sp. 1
Rhizophydiales sp. 2
Rhizophydiales sp. 3
Rhizophydiales sp. 4
Staurastromyces oculus
Rhizophydiales sp. 5a
Rhizophydiales sp. 5b
Protrudomyces lateralis
Globomyces pollinis-pini
Rhizophydiales sp. 6
Rhizophydiales sp. 7
Chytridiales sp. 1
Endocoenobium eudorinae
Dangeardia mamillata
Fungi incertae sedis"
Zygorhizidium planktonicum
chytrids (Rhizophydium sp. C02)

- How we deal with sp.1, sp.2, sp.n?



Next steps

- Do we want to make an extra effort to have more complete datasets (in terms of variables? e.g. water body description, other?)

Parasite taxa, host taxa, coordinates, locality, temperature, salinity, infection prevalence

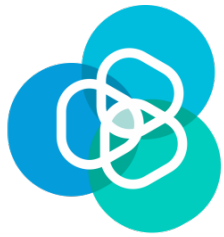
Others?

Where to check the accepted species name/taxonomy?

Catalogue of Life



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the European Union



Strategy to gather more data

1. Do someone in ParAqua willing to share parasite occurrence data?

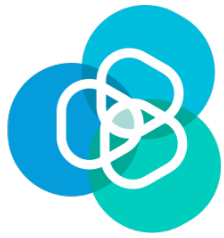
To be useful for the database, the data you want to share should have information at least about one of the following information:

- presence/absence of ALGAE PARASITES along with the location of the collection
- parasite traits data

Additional accompanying data about environmental variables, habitat, and host-related data are welcome.

The full list of variables that we can accommodate in the database is here

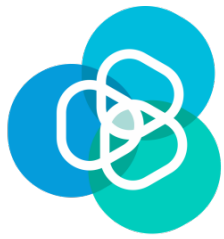
<https://docs.google.com/spreadsheets/d/1Df4RinQF2GgS-r8Wor8Cy7uADWrY3rap/edit?usp=sharing&oid=113032675332595297709&rtpof=true&sd=true>



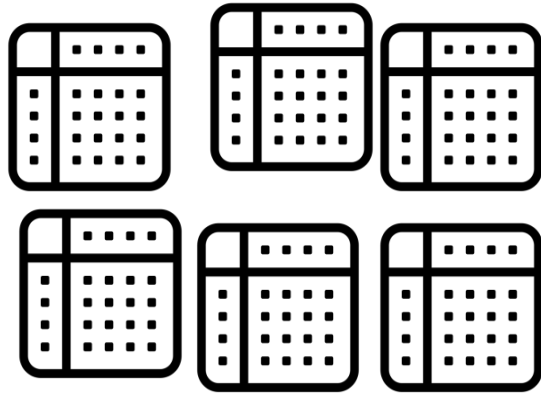
Strategy to gather more data

2. Public call to involve scientists not involved in ParAqua?
 - Target specific people/countries/projects

3. Literature mining
 - Is it overlapping with other ParAqua activities?



Strategy to publish the data

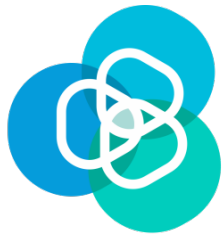


One datapaper that describes all the datasets

The paper point to the DOI(s)

- Single datasets published on LifeWatch Italy data portal
- One metadata for all → One DOI that refer to all the datasets OR
- A metadata for each dataset → Each dataset metadata get a DOI

dataset by Cécile Lanza Parker from [Noun Project](#) (CC BY 3.0)



Kick-off the data paper

1. I will contact the data providers with a draft
2. Target a journal: ideas?
 - Open-access
 - Possibly non-hybrid open access journal
 - Non committed to specific databases
 - Budget



scientific **data**

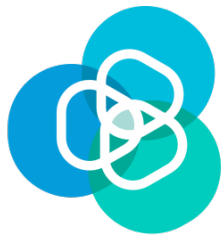
WILEY Online Library

**Global Ecology
and Biogeography**

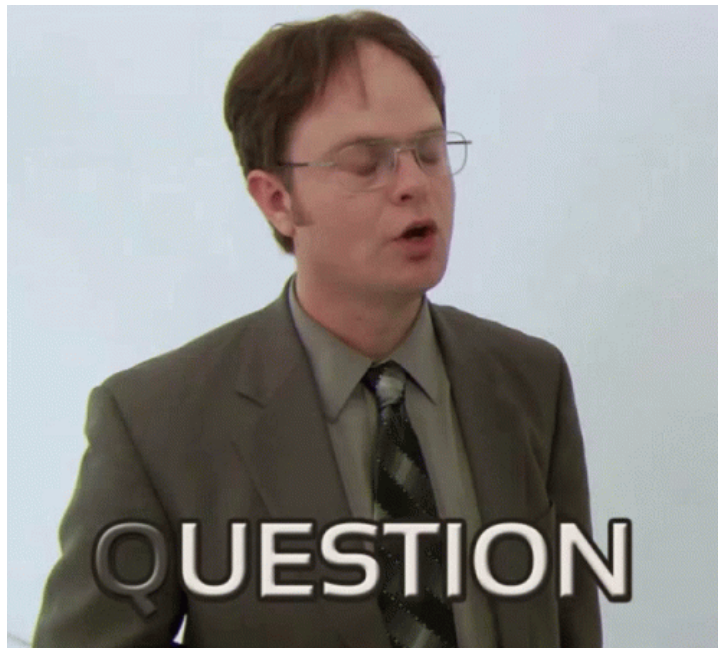
A Journal of
Macroecology

<https://www.gbif.org/data-papers>





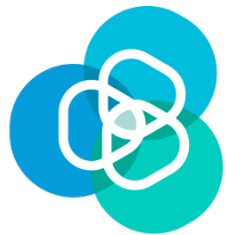
Comments, questions, ideas?





Program

9:00-10:30	The database tale, from the beginning to now
	An overview on the data collected and next steps
	How to use the template for in situ data
	Hands-on session
10:30-11:00	Coffee break
11:00-12:00	Discussion on database structure and layout for the graphical interface



Template

<https://docs.google.com/spreadsheets/d/1Df4RinQF2GgS-r8Wor8Cy7uADWrY3rap/edit#gid=624141016>

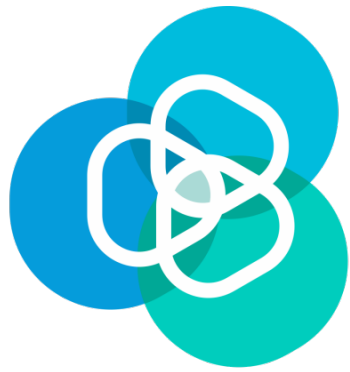


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Program

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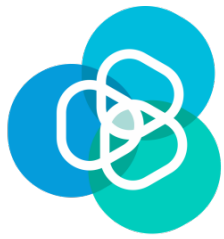
Coffee break

be back at 11:00...



Program

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ParAqua database: the Graphical User Interface

The GUI is what allow everyone to query the DB without using code

It is usually composed of three levels

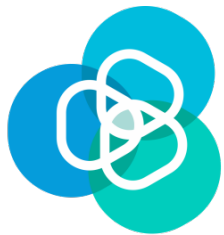
1. The “search” page

View elements Search:

Phylum	Class	Order	Family	Genus	Scientific name	
Mollusca	Bivalvia	Venerida	Cyrenidae	Corbicula	Corbicula fluminalis	Details
Mollusca	Bivalvia	Venerida	Cyrenidae	Corbicula	Corbicula fluminea	Details
Mollusca	Bivalvia	Venerida	Cyrenidae	Corbicula	Corbicula largillierti	Details
Mollusca	Bivalvia	Venerida	Cyrenidae	Corbicula	Corbicula leana	Details
Mollusca	Bivalvia	Venerida	Ungulinidae	Diplodonta	Diplodonta brocchii	Details
Mollusca	Bivalvia	Venerida	Ungulinidae	Diplodonta	Diplodonta intermedia	Details
Mollusca	Bivalvia	Venerida	Ungulinidae	Diplodonta	Diplodonta rotundata	Details
Mollusca	Bivalvia	Venerida	Ungulinidae	Microstagon	Microstagon trigonum	Details
Mollusca	Bivalvia	Venerida	Chamidae	Chama	Chama circinata	Details
Mollusca	Bivalvia	Venerida	Chamidae	Chama	Chama gryphoides	Details

Elements from 1 to 10 on a total of 27,642

Previous **1** 2 3 4 5 ... 2765 Next



ParAqua database: the Graphical User Interface

The GUI is what allow everyone to query the DB without using code

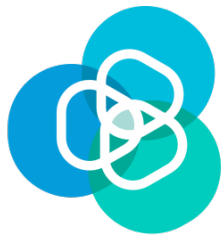
It is usually composed of three levels

1. The “search” page
2. The “result” page

View elements Search:

Phylum	Class	Order	Family	Genus	Scientific name	
Arthropoda	Arachnida	Trombidiformes	Oxidae	Oxus	Oxus (Oxus) musculus	Details
Rotifera	Monogononta	Ploima	Trichocercidae	Trichocerca	Trichocerca musculus	Details
Mollusca	Bivalvia	Mytiloidea	Mytilidae	Musculus	Musculus costulatus	Details
Mollusca	Bivalvia	Mytiloidea	Mytilidae	Musculus	Musculus discors	Details
Mollusca	Bivalvia	Mytiloidea	Mytilidae	Musculus	Musculus subpictus	Details
Mollusca	Gastropoda	Ellobiida	Trimusculidae	Trimusculus	Trimusculus mammillaris	Details
Arthropoda	Insecta	Coleoptera	Elateridae	Paracardiophorus	Paracardiophorus musculus	Details

Elements from 1 to 7 on a total of 7 (filtered from 27,642 total entries) Previous **1** Next



ParAqua database: the Graphical User Interface

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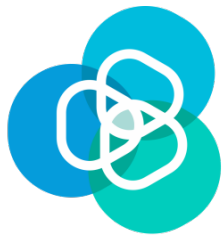
It is usually composed of three levels

1. The “search” page
2. The “result” page
3. The “details” page

Trimusculus mammillaris (Linnaeus, 1758)

- **Scientific Name ID:** urn:lsid:marinespecies.org:taxname:141706
- **Classification:** Mollusca (Phylum) > Gastropoda (Class) > Ellobiida (Order) > Trimusculidae (Family) > Trimusculus (Genus)
- **Endemisms:** not endemic
- **Establishment Means:** native (indigenous)
- **Confirmed Geographic Distribution:**
 - **Italian marine regions:** Ligurian Sea, Northern Tyrrhenian Sea, Southern Tyrrhenian Sea, Messina Strait, Eastern Mediterranean Basin, Ionian Sea
- **Citation:** Renda W., 2021. Mollusca Gastropoda Siphonariida, Ellobiida, Systellommatophora. In: Bologna M.A., Zapparoli M., Oliverio M., Minelli A., Bonato L., Cianferoni F., Stoch F. (eds.), Checklist of the Italian Fauna. Version 1.0. Last update: 2021-05-31.
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The “search” page

Simple search?



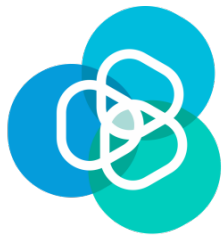
OR

Advanced search?

The screenshot shows a complex search form with the following sections:

- Search:** Includes dropdowns for 'Scientific Name' and 'Authority', and 'begins with' filters. A text input field contains 'e.g. Chromadora kreisi, Stielia, ...'.
- Status:** Includes a '(any)' dropdown, a 'non-checked taxa' checkbox, and a text input field for 'Unaccepted taxon contains...'
- Rank:** Includes 'lower or equal to' and 'Kingdom' dropdowns, a 'Belongs to' text input with 'e.g. Mollusca', and a 'remember' checkbox.
- Environment:** Includes 'Marine' (Yes/No), 'Fresh' (any), 'Brackish' (any), and 'Terrestrial' (any) dropdowns.
- Flags:** Includes 'Fossil' (extant, not fossil-only), 'Image' (unknown), and 'Org. name' (any) dropdowns.
- Note:** Includes '(any)' and 'begins with' dropdowns and a text input field.
- Editor:** Includes '(any)' dropdown, 'Action' (any) dropdown, and 'Alter' (1996-01-01) and 'Before' (2024-01-26) date inputs with calendar icons.

A blue 'Search' button is located at the bottom left of the form.



The “search” page

Simple search?

OR

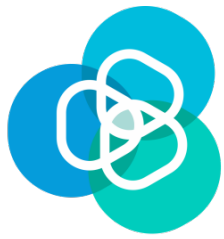
Advanced search?

<https://www.menti.com/al39qt4sbeva>

<https://www.mentimeter.com/>

use code: **85037637**





OF COURSE you want an advanced search!

What are the general information displayed on the search page?

- Dedicated page with list of contributors?
- Dedicated page with list of references?
- What type of information is most critical for users to see on the interface?
- Are there specific data visualizations or charts that would enhance understanding?
- How do users prefer to navigate through and access information?

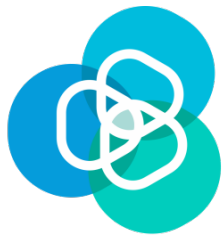
Join at menti.com | use code **8503 7637**

Conversazione in corso: Salle...

What filters you want to add?
24 responses

Sei in condivisione schermo | Interrompi condivisione





OF COURSE you want an advanced search!

Dedicated page with list of contributors?

Dedicated page with list of references?

What filters you want to add?

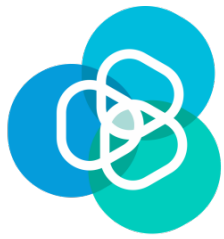
- Taxonomy
- Geography (country/provence/etc.)
- Marine/freshwater
- Host
- Reference (Author/Year)
- Other?

<https://www.menti.com/al39qt4sbeva>

<https://www.mentimeter.com/>

use code: **85037637**

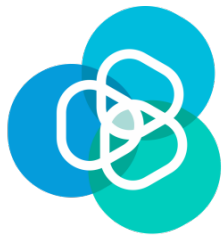




The “results” page

What “columns” you want to show?

Full taxonomy?	Parasite species	Others?				



The “details” page

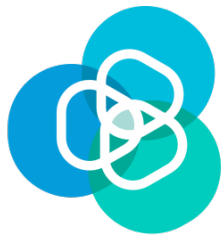


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<https://docs.google.com/presentation/d/1gHeMR4En6SmGibxx9Z7tzeKLYyx5jRFA67eCfDGTZn4/edit?usp=sharing>



Updates and management

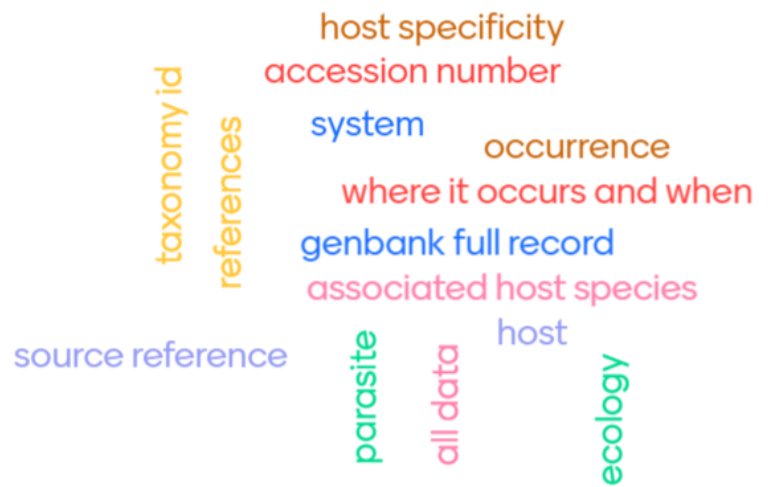
- Data import/export capabilities
- How should users provide feedback on the system or report issues? Who's in charge?
- How many times you foreseen updates?
- Others?

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What "columns" you want to show on the result page?

14 responses



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What filters you want to add?

24 responses

