Linking Biodiversity Literature and Data

Persistent Identifier Exchange Between BHL and Wikidata

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BHL
Biodiversity Heritage Library

The Biodiversity Heritage Library

- An open access digital library for biodiversity literature and archives
- Global consortium working to digitize library collections and make them freely available
- A key component of the core infrastructure for biodiversity research
- Services, data exports, and APIs allow researchers to download and reuse content

Biodiversity Heritage Library

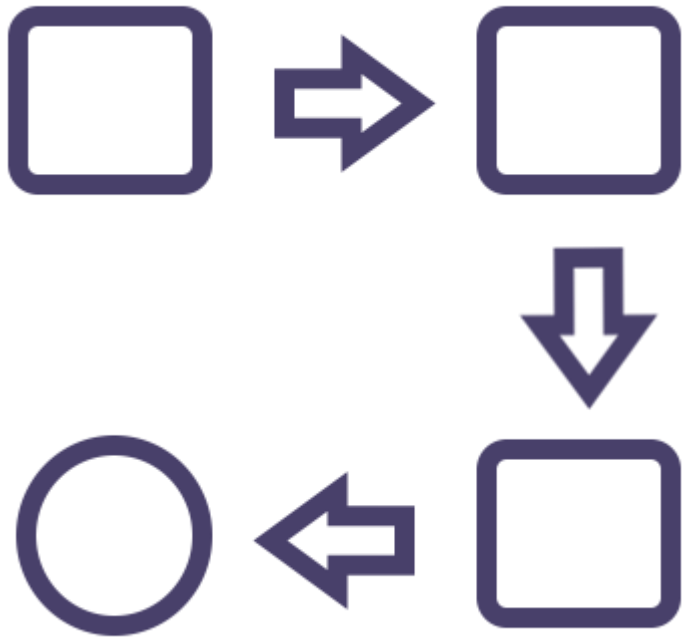
Wikidata

- Free and open knowledge base that can be read and edited by both humans and machines
- Central storage for the structured data of its Wikimedia sister projects
- Content is freely available, exportable in standard formats, and linkable to other open data sets
- A hub for persistent identifiers (PIDs) for domains such as publications, authors, and scientific names

Why Exchange Identifiers?

- Build stronger links between BHL and other biodiversity platforms
- Enhance discoverability of biodiversity literature
- Make curation and corrections easier

The Workflow



Source: Mike Lichtenberg

1. Use SPARQL queries to extract identifiers from Wikidata

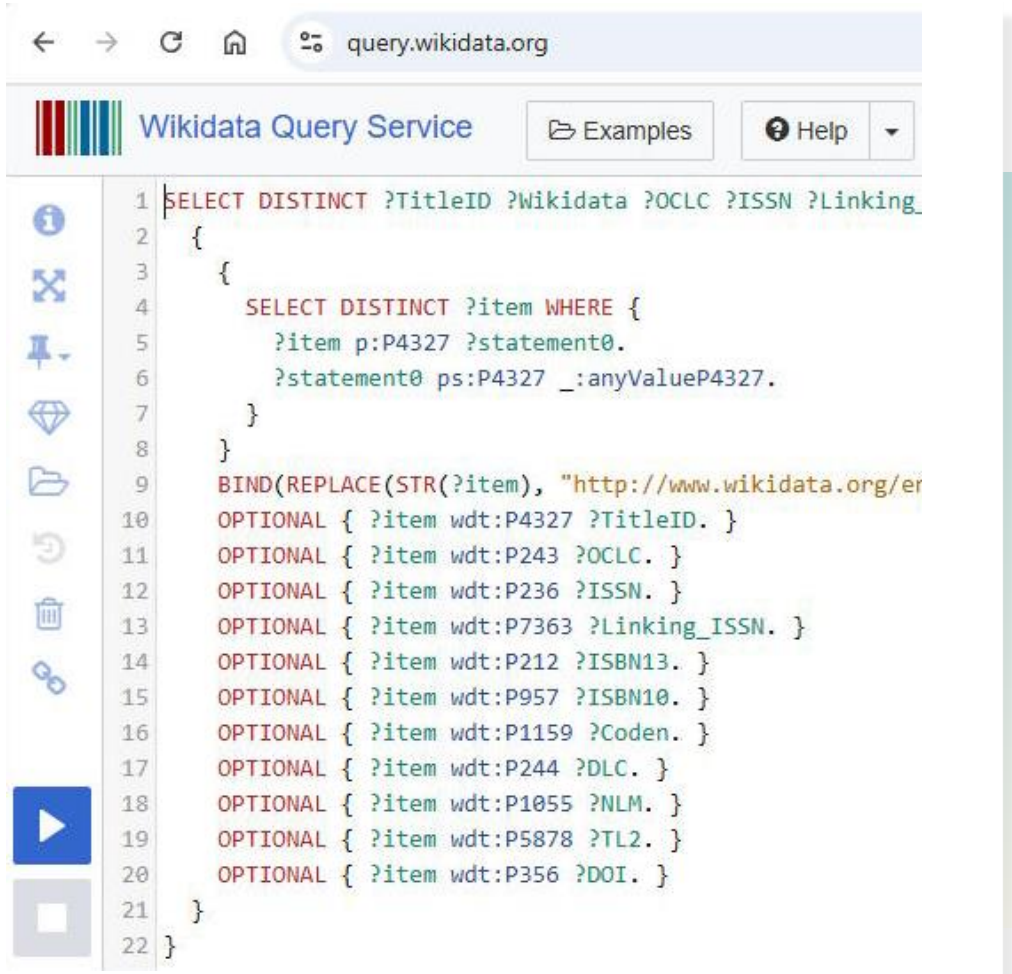
2. Import data into BHL

3. Extract from BHL lists of identifiers requiring curation
   - Identifiers missing from Wikidata
   - Identifiers with irregularities

4. Use Wikidata tools to examine data extracted from BHL and apply changes to Wikidata

Querying Wikidata With SPARQL

- SPARQL is a query language for metadata stored in the Resource Description Framework (RDF) format
- SPARQL is similar to SQL
- The Wikidata Query Service is a tool for writing and executing SPARQL queries, exporting results, and generating code
  - Includes templates and tutorials
- Use federated queries to include results from all of Wikidata



Querying Wikidata With SPARQL: An Example Query

```
SELECT DISTINCT ?TitleID ?Wikidata ?OCLC ?DOI
WHERE {
 {
 {
  SELECT DISTINCT ?item WHERE {
    ?item p:P4327 ?statement0.
    ?statement0 ps:P4327 _:anyValueP4327.
   }
 }
  BIND(REPLACE(STR(?item),
"http://www.wikidata.org/entity/", "") AS
?Wikidata )
  OPTIONAL { ?item wdt:P4327 ?TitleID. }
  OPTIONAL { ?item wdt:P243 ?OCLC. }
  OPTIONAL { ?item wdt:P356 ?DOI. }
 }
UNION
 { SERVICE wdsubgraph:scholarly_articles {
 {
  SELECT DISTINCT ?item WHERE {
    ?item p:P4327 ?statement0.
    ?statement0 ps:P4327 _:anyValueP43272.
   }
 }
  BIND(REPLACE(STR(?item),
"http://www.wikidata.org/entity/", "") AS
?Wikidata )
  OPTIONAL { ?item wdt:P4327 ?TitleID. }
  OPTIONAL { ?item wdt:P243 ?OCLC. }
  OPTIONAL { ?item wdt:P356 ?DOI. }
 }
 }
}
```

1
2
3
4

From Wikidata to BHL

TitleID	Wikidata	OCLC	DOI
29753	Q51381722	31896870	10.5962/BHL.TITLE.29753
110114	Q51386632		10.5962/BHL.TITLE.110114
169133	Q97683524	1290604141	10.1206/0003-0082(2006)3539[1:RCIBAN]2.0.CO;2
169133	Q97683524	442549156	10.1206/0003-0082(2006)3539[1:RCIBAN]2.0.CO;2

Wikidata Query Results

- BHL import process is fully automated, with no human curation of data
  1. Identifiers are compared to existing BHL data
  2. Any identifiers not already in BHL are added

- Others creating similar processes may prefer a different workflow

From BHL To Wikidata

- BHL does not just take from Wikidata; it also contributes back
- After data is added to BHL, a downloadable report is produced
- Report includes
  - BHL data missing from Wikidata
  - Data requiring curation
- Wikimedians make use of the report and Wikidata tools to curate the data and apply changes to Wikidata
- Feedback loop with BHL staff for corrections

Benefits

- Repeatable, adaptable workflow
- 65000 identifiers added to BHL and 8000 to Wikidata
  - Improved discoverability
  - Improved trust in the metadata
  - All identifiers available via Wikidata SPARQL queries and BHL APIs/Exports
- Discoverable data quality issues

Vultur gryphus
https://biodiversitylibrary.org/page/29568719

Supporting Information

Presentation Slides and Code

- **https://github.com/mlichtenberg/LivingData2025**

11-Minute Introduction to SPARQL

- https://youtu.be/FvGndkpa4K0?si=wLus8Qk1MxF5ycHQ

Wikidata Query Service

- https://query.wikidata.org

Wikidata Property Lookup

- https://www.wikidata.org/wiki/Wikidata:List_of_properties

Background Information: Wikidata Graph Split

- https://meta.wikimedia.org/wiki/WikiCite/WDQS_graph_split

BHL Wikidata Harvest Source Code

- https://github.com/gbhl/bhl-us/tree/master/WDHarvest

Thank you!

Please Support BHL!