



# COMPONENT REPORT

**Project Acronym:** OpenUp!  
**Grant Agreement No:** 270890  
**Project Title:** Opening up the Natural History Heritage for Europeana

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## C1.5.1 – OpenUp! and the results of the STERNA project

**Revision:** Final

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|--|--|---|
| Dissemination Level  |  |   |
| P  | Public   | X |
| C  | Confidential, only for members of the consortium and the Commission Services |   |



## **REVISION HISTORY AND STATEMENT OF ORIGINALITY**

### **Revision History**

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| 3 <sup>rd</sup> Draft | March 12 <sup>th</sup> 2012   | Boris Jacob                    | MRAC                | Editorial changes, incorporation of information on STERNA documentation                           |
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### **Statement of Originality:**

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

### **Distribution**

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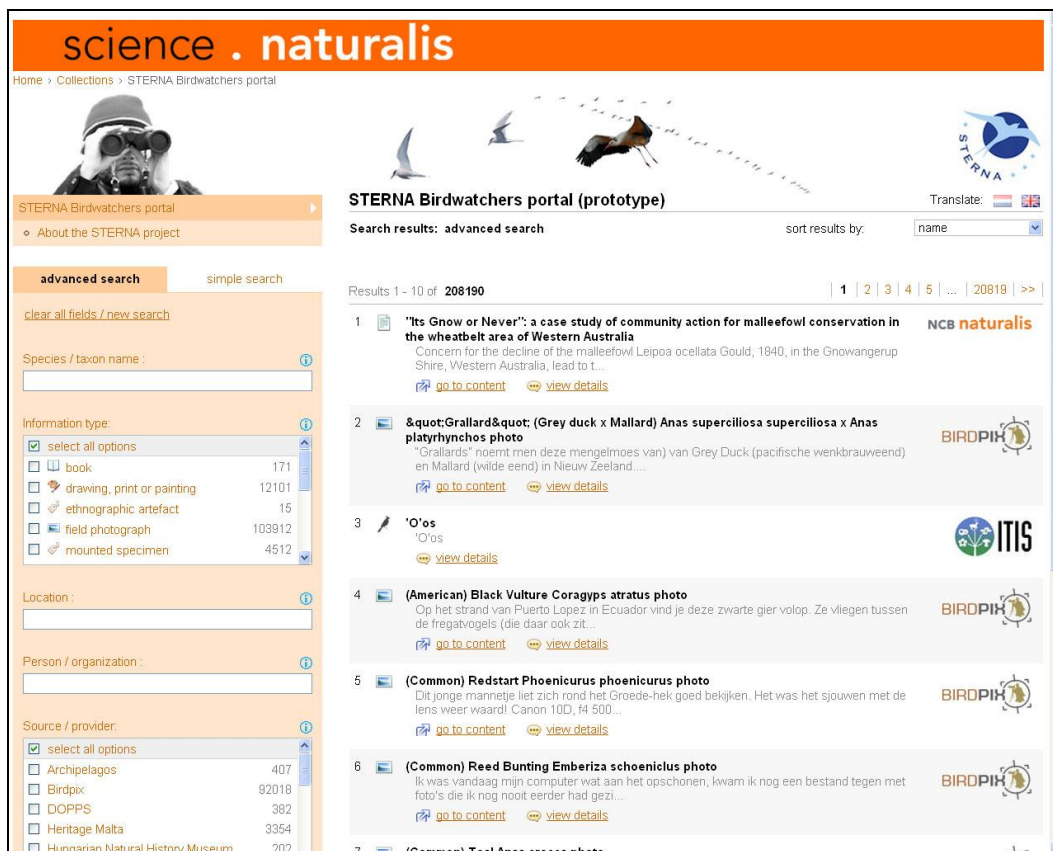


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## About the project and the partners

The aim of the STERNA project<sup>1</sup> (*Semantic web-based Thematic European Reference Network Application*) was the development of a prototype studying the feasibility to use RDF<sup>2</sup> (Resource Description Framework) as a standard to create a central access point and query data sources for data with heterogeneous structure and coming from different domains (such as Biodiversity information, but also art collections, input from citizen scientists).



The screenshot shows the 'science.naturalis' website interface. The main heading is 'science.naturalis'. Below it, there's a navigation bar with 'Home > Collections > STERNA Birdwatchers portal'. The page features a search bar with 'Search results: advanced search' and a 'sort results by:' dropdown set to 'name'. On the left, there are search filters for 'Species / taxon name', 'Information type' (with a list of options like 'book', 'drawing, print or painting', etc.), 'Location', 'Person / organization', and 'Source / provider'. The main content area displays a list of search results, each with a title, a brief description, and a 'go to content' or 'view details' link. The results are numbered 1 through 6, with the 7th result partially visible.

Fig. 1 Decentralized STERNA search portal by Naturalis<sup>3</sup>, the Netherlands

The assumption was that the abstraction level offered by the semantic web would allow interoperability between the data sources, which have no common structure in the first place. The aim was achieved by establishing a decentralized search portal, which provides resulting matching records from those different data sources.

STERNA has been initialized by Naturalis (now NCB Naturalis) and the IT company Trezorix<sup>4</sup>. It has been funded in the framework of the European *eContentplus* programme<sup>5</sup> and supported the

<sup>1</sup> STERNA project Website: <http://www.sterna-net.eu/>

<sup>2</sup> For more information see: [http://en.wikipedia.org/wiki/Resource\\_Description\\_Framework](http://en.wikipedia.org/wiki/Resource_Description_Framework)

<sup>3</sup> Decentralized STERNA search portal by Naturalis <http://science.naturalis.nl/collections/sterna-birdwatchers-portal>

<sup>4</sup> Trezorix Homepage: <http://www.trezorix.nl/home.aspx?lang=en>

objectives of the European Digital Library by integrating semantically enriched digital resources from the domain of natural science, biodiversity and conservation. The project ran from June 1st 2008 to November 30st 2010, with total cost of €1.87m and an EU contribution of €1.50m.

## Accessibility of STERNA content

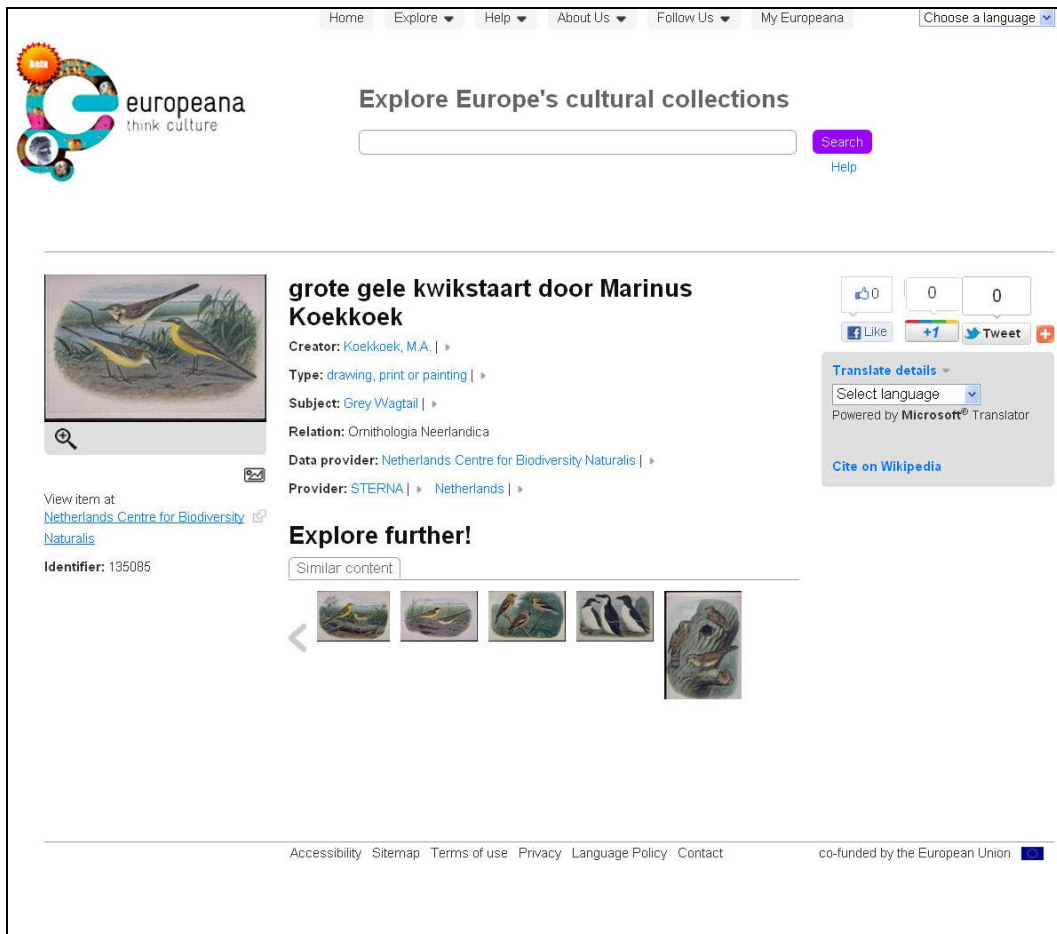


Fig. 2 Printscreen of the drawing titled “grote gele kwikstaart door Marinus Koekkoek” from NCB Naturalis in Europeana<sup>6</sup>

<sup>5</sup> European Commission project description:

[http://ec.europa.eu/information\\_society/apps/projects/factsheet/index.cfm?project\\_ref=ECP-2007-DILI-517012](http://ec.europa.eu/information_society/apps/projects/factsheet/index.cfm?project_ref=ECP-2007-DILI-517012)

<sup>6</sup> Printscreen of the drawing titled “grote gele kwikstaart door Marinus Koekkoek” from NCB Naturalis in Europeana

<http://www.europeana.eu/portal/record/10102/31CF30030C16A032905B71BDFBC7A5CD519EFD37.html>

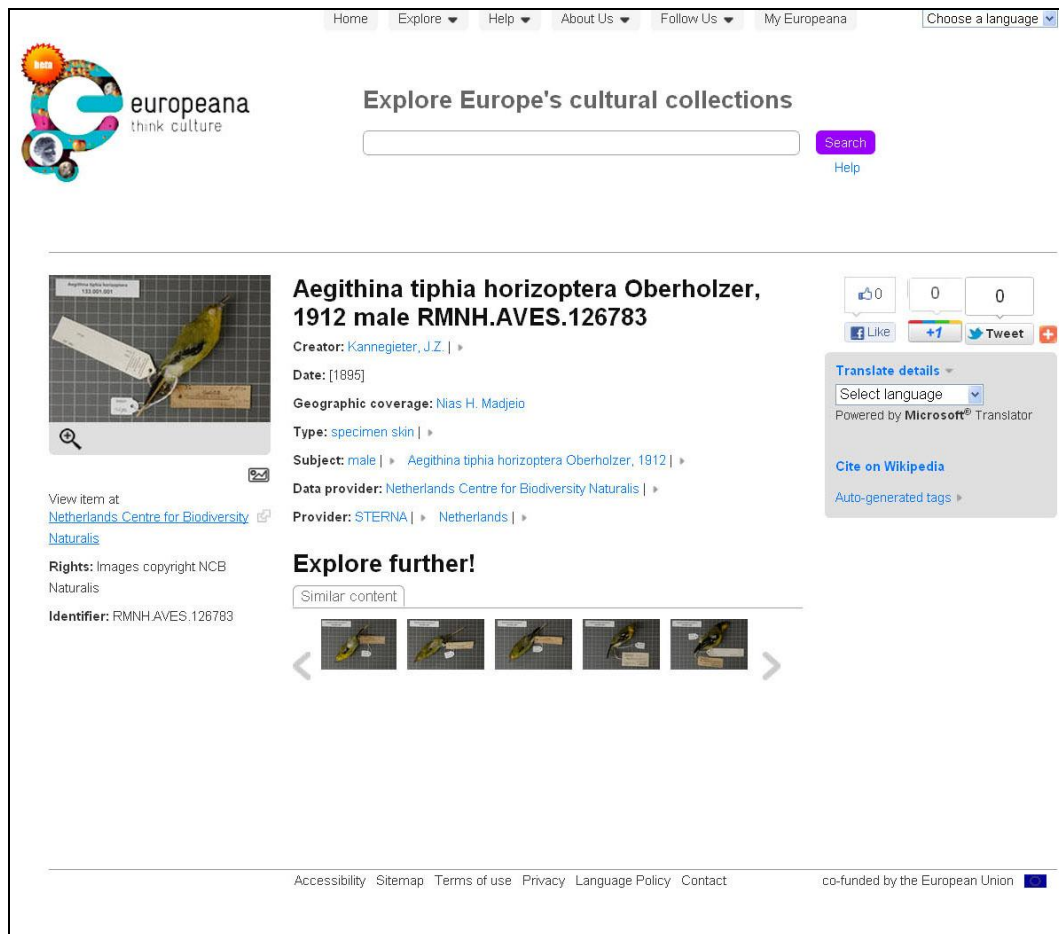


Fig. 3 The “*Aegithina tiphia horizopectera* Oberholzer, 1912” from NCB Naturalis in Europeana<sup>7</sup>

In addition to the Naturalis Portal and Europeana, STERNA data can also be accessed *via* other portals<sup>8</sup>, which allows the data to be retrieved by different target audiences:

- ARKive/Wildscreen’s search portal: <http://sterna.arkive.org/>
- Archipelagos Wildlife Library: <http://wildlife-archipelago.gr/wordpress/sterna/sternasearch/>
- Heritage Malta search portal: <http://www.heritagemalta.org/sterna/portal.php>

## Technical background

A harvesting service has been developed by NCB Naturalis and Trezorix, based on tools developed by the larger project called Reference Network Architecture<sup>9</sup> (RNA).

Like it is planned for OpenUp!, this service performed metadata enrichment and provided data to the Europeana portal. In the case of the contribution of the MRAC and MNHN Luxembourg to the

<sup>7</sup> The “*Aegithina tiphia horizopectera* Oberholzer, 1912” from NCB Naturalis in Europeana:

<http://www.europeana.eu/portal/record/10102/374D8B570D95E1B4BAB26E469066A8CD08946C2D.html>

<sup>8</sup> See <http://www.sterna-net.eu/index.php/en/windows>

<sup>9</sup> Project Website: <http://www.rnaproject.org/> / Documentation <http://www.rnaproject.org/whitepapers.aspx>



project, it was suggested to also harvesting a BioCAsE<sup>10</sup> (Biological Collection Access Service) provider. However, no strict correspondence between ABCD<sup>11</sup> (Access to Biological Collection Data) and ESE<sup>12</sup> (Europeana Semantic Elements) had been communicated to the data providers as ingestion of data into Europeana was only one part of the project. The RNA tool data model was enhanced by ABCD concepts necessary to the ornithological data to be provided.

There were some specificities of the STERNA project that do not appear in OpenUp!:

- The main difference between the STERNA harvesting service and the OpenUp! architecture lies in the fact the STERNA harvester had to gather data that with different structures (XML schemas like ABCD but also Word documents and HTML pages, for example) and convert them into RDF information to be stored in a metadata database. The ingest of data into Europeana was done at a third level, by converting the RDF metadata into ESE. In contrast, the OpenUp! harvester only interacts with two XML schemata, ABCD and ESE, and directly aims at an integration of ABCD data into ESE.
- At first the data model of the RNA tool was supposed to be enhanced by just a few ABCD concepts, however during the project the complexity of taxonomy-related data was recognized by the partners and all ABCD concepts had to be taken on board. Thus existing standards in biodiversity should be considered more in depth for re-use in such projects rather than adding biodiversity concepts to standards from other domains.
- Another difference resides in the fact that the data provider could directly check and edit the metadata via the web interface of the RNA toolkit (for instance to correct an unmapped or unparsed element). In contrast, the OpenUp! providers edit metadata only at the source, and when defining their ABCD mapping. The Sterna method, however, had the downside that changes made manually in the system were not necessarily taken on when an update of the system was done. So some changes had to be repeated manually several times during the project.
- The RNA toolset was also conceived to work in two modes: 1) fully centralized: the query of users where all oriented to the central metadata database, or 2) decentralized, where the query was directly dispatched to the provider. The decentralized mode was only possible if the services of the provider were already ready for semantic web. This was actually the case of one single provider Naturalis, which stored a taxonomic thesaurus in the SKOS format (by using a SQL database as backend) also used in the Dutch species site <http://nederlandsesoorten.nl>

The STERNA project used two technologies related to the Semantic Tool: RDF for the storage of metadata in a central repository and SKOS<sup>13</sup> (Simple Knowledge Organization System) for the organization of a thesaurus of keywords in the form of tree gathering multilingual synonyms. The SKOS keywords were editable *via* an interface running at: <http://www.science.naturalis.nl/>

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<sup>10</sup> Homepage: <http://www.biocase.org/> / Documentation: [http://wiki.bgbm.org/bps/index.php/Main\\_Page](http://wiki.bgbm.org/bps/index.php/Main_Page)

<sup>11</sup> ABCD Schema documentation: <http://wiki.tdwg.org/ABCD/>

<sup>12</sup> ESE Schema documentation: [http://www.version1.europeana.eu/c/document\\_library/get\\_file?uuid=77376831-67cf-4cff-a7a2-7718388eec1d&groupId=10128](http://www.version1.europeana.eu/c/document_library/get_file?uuid=77376831-67cf-4cff-a7a2-7718388eec1d&groupId=10128)

<sup>13</sup> For more information see: <http://en.wikipedia.org/wiki/SKOS>





Compared to other STERNA consortium partners, institutions already using BioCAsE (like MRAC, which provided images of its bird type specimens) were in a relatively comfortable position concerning interoperability because the ABCD schema had a precise documentation of the semantic relation between the real world objects and its XML elements and was flexible enough to offer different level of data completeness. The data schema ultimately developed by STERNA reused a substantial amount of ABCD concepts. For these reasons, data providers using BioCAsE could submit within the framework of the project their data into the RNA Toolset (managed by Trezorix and NCB Naturalis<sup>14/15</sup>), as well as to GBIF<sup>16</sup>. Both data portals can serve to interlink data sets to Europeana.

It seems that the data flow was perceived as requiring more automation by the content providers, and that the use of BioCAsE improved its smoothness. This perception is probably inherent to the challenge of gathering, enriching, cross-linking and publishing heterogeneous data sources that had been intentionally addressed by the project and formed its essence. All in all, STERNA represent a valuable and laudable effort to produce a functional architecture using semantic web as technology able to fill the gap between science and public. It was also an indirect incentive to the data providers to check the quality of their data and publish more content on-line.

The experience gained from this project, both at the level of the central harvester and content provider is very precious for OpenUp! it demonstrates the possibility to reuse BioCAsE in a federated network not directly oriented towards biodiversity content, by the means of the development of a harvesting service interfacing ABCD with other structured schema.

## Use case: MRAC's data in STERNA and Europeana

MRAC submitted STERNA data to Europeana via an intermediate RNA toolset that harvests our BioCAsE provider. This RNA toolset maps the harvested data in ESE format (based on Dublin Core) before being itself harvested by Europeana.

The connection of STERNA data from MRAC to Europeana has been done by using the BioCAsE provider software. A BioCAsE/PyWrapper v.2.4 installation<sup>17</sup> linked to the RNA Toolset, and thus provided the MRAC's data for STERNA's online search portals<sup>18</sup>.

A second BioCAsE/PyWrapper v.2.5 installation, in which each type specimen is linked to its basionym and current name plus corresponding references, keeps the data to be provided to GBIF<sup>19</sup>.

In the process of MRAC's preparation of the data two questions arose:

1. How to select only one thumbnail for the Europeana portal when the data provider provided more than one? (See chapter: Images).

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<sup>14</sup> General STERNA decentralized search portal by Naturalis: <http://science.naturalis.nl/collections/sterna-birdwatchers-portal>

<sup>15</sup> MRAC's STERNA data set in Naturalis' portal: [http://science.naturalis.nl/collections/sterna-birdwatchers-portal?rnax\\_source=Royal+Museum+for+Central+Africa&lang=en&sortResultsBy=item\\_name+asc](http://science.naturalis.nl/collections/sterna-birdwatchers-portal?rnax_source=Royal+Museum+for+Central+Africa&lang=en&sortResultsBy=item_name+asc)

<sup>16</sup> MRAC's STERNA data via BioCAsE: [http://193.190.223.47/biocase\\_rmca/querytool/main.cgi?dsa=STERNA\\_gbifmapping](http://193.190.223.47/biocase_rmca/querytool/main.cgi?dsa=STERNA_gbifmapping)

<sup>17</sup> See: [http://193.190.223.48/BiocaseProvider\\_2.4.2/www/querytool/main.cgi?dsa=STERNA](http://193.190.223.48/BiocaseProvider_2.4.2/www/querytool/main.cgi?dsa=STERNA)

<sup>18</sup> See MRAC's STERNA data set in Naturalis' portal: [http://science.naturalis.nl/collections/sterna-birdwatchers-portal?rnax\\_source=Royal+Museum+for+Central+Africa&lang=en&sortResultsBy=item\\_name+asc](http://science.naturalis.nl/collections/sterna-birdwatchers-portal?rnax_source=Royal+Museum+for+Central+Africa&lang=en&sortResultsBy=item_name+asc)

<sup>19</sup> See [http://193.190.223.47/biocase\\_rmca/querytool/main.cgi?dsa=STERNA\\_gbifmapping](http://193.190.223.47/biocase_rmca/querytool/main.cgi?dsa=STERNA_gbifmapping)



- How to keep a reference to the original metadata in the Europeana portal, when the original ones are more complete than the one displayed by Europeana (not only in term of scientific content, but also when citing the associated partners or giving information on the intellectual property of the data)? (See chapter: Link to external metadata).

## Images

Currently the data we provided for STERNA are available on the Europeana portal but without image (see Fig. 1 for example):

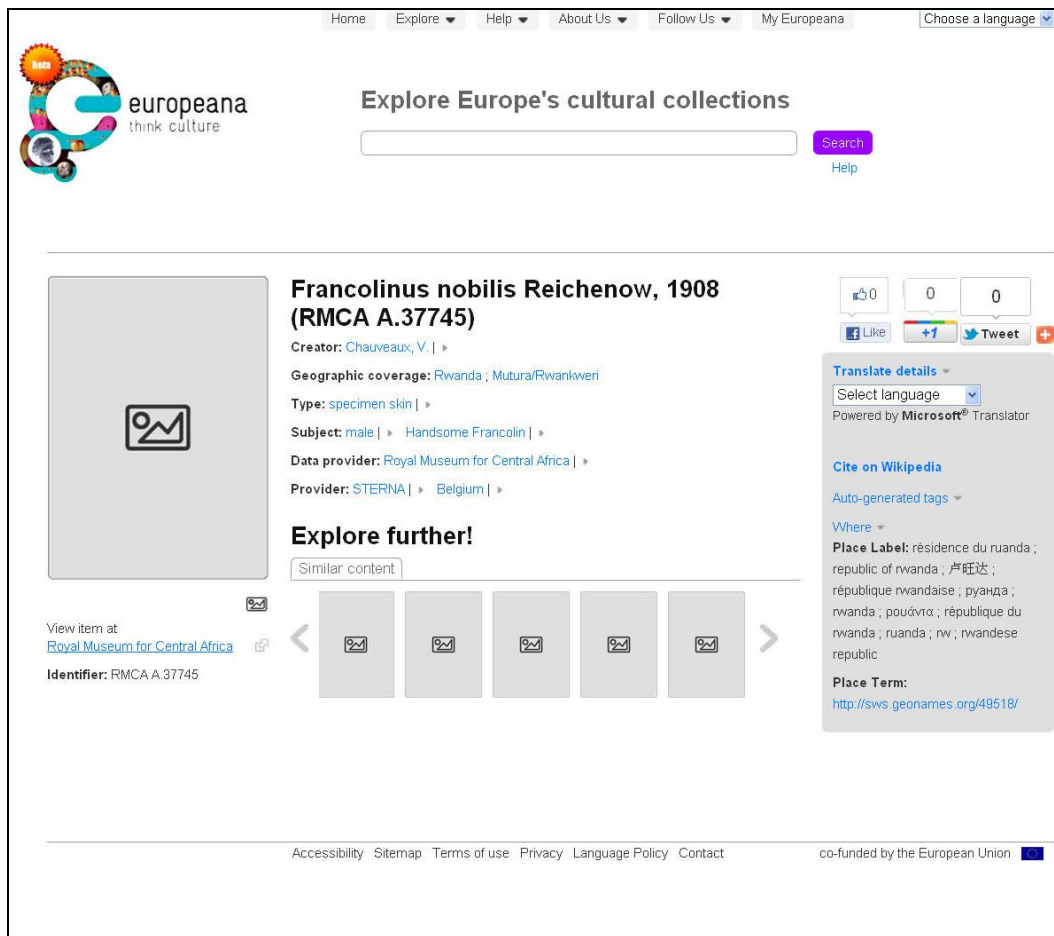


Fig. 4 Screenshot of information on specimen “*Francolinus nobilis* Reichenow, 1908” in Europeana<sup>20</sup>

Originally, the BioCAsE provider mapped up to three images for each specimen. Each of these images exists in two forms:

- a thumbnail (which is displayed in the BioCAsE query tool)
- a Zoomify applet (which is accessible via a link in the query tool): e.g.

<http://biology.africamuseum.be/STERNAImages/Ornithology/SternaRMCADetails.php?image= PHM7333>

<sup>20</sup> Screenshot of information on specimen “*Francolinus nobilis* Reichenow, 1908” in Europeana:  
<http://www.europeana.eu/portal/record/10103/0DDED231BAB72DF6A1686DE46B5C6EA7FB5CE474.html>



The thumbnail and the link to the Zoomify applet are mapped under the same ABCD element ('MultiMediaObject/FileURI'). So this element can be repeated up to six times for each specimen<sup>21</sup>. Normally Europeana should have harvested at least one of the thumbnails and displayed it on their page. At the moment of the first harvest neither the colleagues from Leiden nor us, were aware that Europeana had an issue with multiple images for one item. We found it out afterwards when this was displayed as a blank zone on their site.

A way to solve this problem would be to use another XML element to 'flag' the thumbnail that can be used by Europeana. The MIMO project<sup>22</sup> on musical instruments has chosen this approach. Between Europeana and MRAC it has been discussed to reharvest the data using a "preferredImage" flag and take the desired thumbnail. The key issue is that this flag has to be written at two levels:

- in the ABCD data provided by our BioCASE providers,
- in the ESE data provided by the RNA toolset, that are harvested by Europeana.

All the involved partners have to agree on the meaning of the different XML elements, and to perform harvesting of updated data in the same period of time. These are the most delicate parts, especially when it occurs after the official end of a project like it is the case with STERNA.

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<sup>21</sup> The Query Tool uses an updated XSL-T document doing a pattern matching on the URI to know when it refers to the thumbnail and when it refers to the Zoomify applet.

<sup>22</sup> Homepage: <http://www.mimo-project.eu>

Link to external metadata



Fig. 5 Screenshot of information and pictures on the specimen “*Francolinus nobilis* Reichenow, 1908” in the Zoomify application on the MRAC website<sup>23</sup>

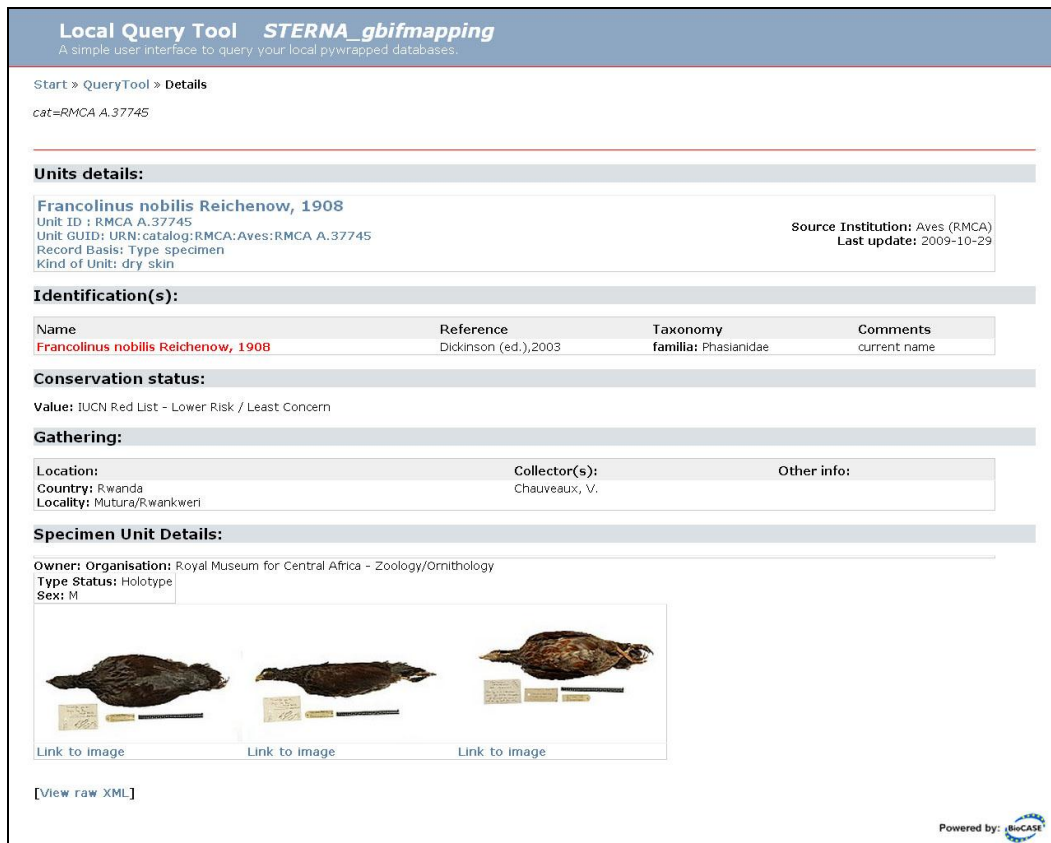
As far as we understood Europeana can also display only one link to the external source. The Europeana page actually features a button “Link to complete metadata”. From this link, it is possible to retrieve the original metadata by chaining together the different resources in the appropriate order.

For the publishing of STERNA data in Europeana, we used the following order:

1. The link to the complete metadata “View item at” on the Europeana page (see Fig. 4) refers to the Zoomify applet.
2. This Zoomify applet already contains the logo of the project partners and the scientific credits of the data (see Fig. 5).
3. The Zoomify applet also features links to other images of the same specimen (that are also under the form of references to Zoomify applets, see Fig. 5).
4. The Zoomify applet finally contains a link to the graphical representation of the specimen in the BioCAsE QueryTool (see Fig. 6).

<sup>23</sup> Screenshot of information and pictures on the specimen “*Francolinus nobilis* Reichenow, 1908” in the Zoomify application on the MRAC website: <http://biology.africamuseum.be/STERNAImages/Ornithology/SternaRMCADetails.php?image= PHM7333>

- The BioCASE query tool offers natively a link to the raw and complete data in ABCD format; with complete taxonomical information, IPR statements and terms of uses.



**Local Query Tool STERNA\_gbifmapping**  
A simple user interface to query your local pywrapped databases.

Start » QueryTool » Details  
cat=RMCA A.37745

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**Units details:**

**Francolinus nobilis Reichenow, 1908**  
Unit ID : RMCA A.37745  
Unit GUID: URN:catalog:RMCA:Aves:RMCA A.37745  
Record Basis: Type specimen  
Kind of Unit: dry skin

**Source Institution:** Aves (RMCA)  
**Last update:** 2009-10-29

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**Identification(s):**

| Name                                       | Reference            | Taxonomy             | Comments     |
|--|----------------------|----------------------|--------------|
| <b>Francolinus nobilis Reichenow, 1908</b> | Dickinson (ed.),2003 | familia: Phasianidae | current name |

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**Conservation status:**

**Value:** IUCN Red List - Lower Risk / Least Concern

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**Gathering:**

| Location:                                     | Collector(s): | Other info: |
|---|---------------|-------------|
| Country: Rwanda<br>Locality: Mutura/Rwankweri | Chauveaux, V. |             |

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**Specimen Unit Details:**

**Owner:** Organisation: Royal Museum for Central Africa - Zoology/Ornithology  
**Type Status:** Holotype  
**Sex:** M

Link to image      Link to image      Link to image

[View raw XML]


Powered by: 

Fig. 6 Graphical representation of the specimen in the BioCASE QueryTool<sup>24</sup>

## Conclusion

Our content providers really appreciate that the BioCASE and the GBIF portals clearly display the terms of Use, the disclaimer and how we want to be cited.

They also group by data providers the list of all items matching the same search criteria. But in Europeana the user has to click on the successive links to get this information.

As it is technically possible to link from Europeana to an external resource, for STERNA we mapped as much information and multimedia documents as possible in the data provider. However, the reference link provided to Europeana wasn't directly the URI of the data provider but a link to an intermediate page:

- already displaying IPR statements, terms of use and credits
- cross-linking the different multimedia document related to the same object
- containing a reference to the object in the BioCASE data provider

<sup>24</sup> Graphical representation of the specimen in the BioCASE QueryTool:  
[http://193.190.223.47/biocase\\_rmca/querytool/details.cgi?dsa=STERNA\\_gbifmapping&detail=unit&wrapper\\_url=http://193.190.223.47/biocase\\_rmca/pywrapper.cgi?dsa=STERNA\\_gbifmapping&schema=http://www.tdwg.org/schemas/abcd/2.06&cat=RMCA%20A.37745](http://193.190.223.47/biocase_rmca/querytool/details.cgi?dsa=STERNA_gbifmapping&detail=unit&wrapper_url=http://193.190.223.47/biocase_rmca/pywrapper.cgi?dsa=STERNA_gbifmapping&schema=http://www.tdwg.org/schemas/abcd/2.06&cat=RMCA%20A.37745)



This way we could both comply with the Europeana architecture, and retrieve from the Europeana page complete metadata, multimedia documents, terms of use and IPR statements that cannot be displayed by Europeana.

This approach could be potentially reused in OpenUp! but has to be discussed with the technical providers along with other suggestions. The link to provide to Europeana is a key issue as the content providers need to be correctly credited on one hand and on one another Europeana is intended in priority for the general public that doesn't have the habit of checking the source reference of an information for more details like scientists or experts are supposed to do.

## Annex

### *Documentation and publications*<sup>25</sup>

This chapter presents an annotated list of documentation on the STERNA project. Overall information can be found on the STERNA project website at <http://www.sterna-net.eu/>. It includes information on the architecture and the content enrichment process. Furthermore several use case studies have been published and two annual reports. Access to the RNA Toolset™

<http://rnatoolset.sterna-project.eu/>, as well as the online manual <http://manual.rnatoolset.net> require a login.

The following three presentations give an overview of the project and its technological architecture.

- Mulrenin, Andrea (Salzburg Research): *Sterna - Building a Digital Library for European Wildlife Enthusiasts & Bird Lovers*. Introduction to the STERNA project, including project idea and challenges, digital library solutions, technology and expected results: [http://www.sterna-net.eu/images/stories/documents/sterna\\_project\\_presentation\\_v1.0.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_project_presentation_v1.0.pdf)
- S. Cooleman, G. Geser, M. Louette, D. Meirte, P. Mergen, A. Mulrenin and S.M. Pieterse (RMCA u.a.): *STERNA advanced semantic web tool about resources on birds*. Overview presentation of the STERNA project at TDWG 2010 conference, visualizing the technical infrastructure, showing RNA toolkit, BioCAsE installation and pictures displayed in Zoomify, as well as information shown in the Naturalis STERNA portal: [http://www.tdwg.org/fileadmin/2010conference/slides/Cooleman\\_STERNA\\_PC-demo\\_TDWG2010.ppt](http://www.tdwg.org/fileadmin/2010conference/slides/Cooleman_STERNA_PC-demo_TDWG2010.ppt)
- Nederbragt, Hans (Trezorix): *introduction to the Sterna architecture*. Presentation of the STERNA architecture and data: [http://www.sterna-net.eu/images/stories/documents/sterna\\_architecture\\_01.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_architecture_01.pdf)  
Partnership Agreement and Terms and Conditions for Content Contributors between Naturalis and the partner.
- Naturalis: Partnership Agreement. 2009. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_partnership\\_agreement\\_fina\\_blank\\_20100224.doc](http://www.sterna-net.eu/images/stories/documents/sterna_partnership_agreement_fina_blank_20100224.doc)

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<sup>25</sup> See Component 7.2.1 Identification of existing documentation (*in press*)



First and second annual report of the STERNA project addressing aims and partners of STERNA, as well as the technical aspects like network architecture, RNA toolset and STERNA API, an evaluation of organizational and technical aspects of the STERNA project can be found in the final report.

- Mulrenin, Andrea (Salzburg Research): Annual Report 1: 1 June 2008 - 31 May 2009. 2009. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_del1.1.2\\_annual\\_report1.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_del1.1.2_annual_report1.pdf)
- Mulrenin, Andrea (Salzburg Research): Annual Report 2 : 1 June 2009 - 31 May 2010. 2010. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_annual\\_report\\_10\\_web.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_annual_report_10_web.pdf)
- Baltussen, Lotte Belice & Geser, Guntram (Netherlands Institute for Sound and Vision, Salzburg Research): STERNA Deliverable 5.3.4: STERNA Evaluation – Final report. 2010. URL: [http://www.prestocentre.org/system/files/library/resource/STERNA\\_D5.3.4\\_Final\\_Evaluation\\_Report\\_FINAL.pdf](http://www.prestocentre.org/system/files/library/resource/STERNA_D5.3.4_Final_Evaluation_Report_FINAL.pdf)

The STERNA Technology Watch Report (July to November 2008) gives a detailed insight into initiatives in content and metadata enrichment, digital collections and semantic web technologies. A summary of the report has been published as a separate document. Both documents are very useful for other technology projects as well.

- Geser, Guntram (Salzburg Research): Technology Watch Report : A Report on Semantic Approaches for Including Digital Cultural and Bio-Heritage Resources in the European Digital Library Initiative. 2009. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_tech\\_watch\\_report\\_layoutiert\\_web.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_tech_watch_report_layoutiert_web.pdf)
- Geser, Guntram (Salzburg Research): 6.5. Technology Watch Report : Summary of Part B: Natural history and biodiversity resources for the European Digital Library initiative. 2008. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_del.6.5\\_technology-watch\\_summary-partb\\_natural-history\\_20081210.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_del.6.5_technology-watch_summary-partb_natural-history_20081210.pdf)

Overview of the STERNA project and architecture, reference structure and metadata can be found in the following documents, which could be relevant for OpenUp! as they present possible scenarios to link an XML schema like ABCD with harvesting service based related to semantic web, using standards like RDF and SKOS.

- Trezorix: Sterna architecture : overview. 02.02.2008. URL: <http://www.rnaproject.org/media/34563/rna%20report%20-%20c%20sterna%20architecture.pdf>
- Nederbragt, Hans (Trezorix): Reference networks : Modeling with RNA Toolset 4. 2010. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_reference\\_network\\_modelling\\_with\\_toolset4.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_reference_network_modelling_with_toolset4.pdf)
- Nederbragt, Hans (Trezorix): An Architecture for Networked Collections : Overview of the RNA Architecture. 2009. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_del\\_4.2\\_architecture\\_networked\\_collections\\_revised\\_20091009-1.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_del_4.2_architecture_networked_collections_revised_20091009-1.pdf)

- Nederbragt, Hans & Heerlien, Maarten (Trezorix): Methodology for Content Enrichment. 2010. URL: [http://www.sterna-net.eu/images/stories/documents/sterna\\_del\\_2.2.2\\_methodology\\_final.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_del_2.2.2_methodology_final.pdf)

Five STERNA use cases have been published, four of whom involving users searching for scientific data, and a fourth one about the ingest of data into Europeana:

- Archipelagos: *Use Case "At Sea"*. Use case scenario involving searching information about the Comorant dove in the STERNA portal: [http://www.sterna-net.eu/images/stories/documents/sterna\\_uc\\_at\\_sea-1.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_uc_at_sea-1.pdf)
- Heritage Malta: *Use Case: Cory's Shearwater*. Use case scenario involving searching information about the Albatross in the STERNA portal: [http://www.sterna-net.eu/images/stories/documents/sterna\\_cs\\_corys\\_shearwater.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_cs_corys_shearwater.pdf)
- Wildscreen: *Use Case for a Young, digitally savvy, civil society audience*. Use case scenarios showing "competing" data, already existing on the internet: [http://www.sterna-net.eu/images/stories/documents/sterna\\_uc\\_young\\_audience-1.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_uc_young_audience-1.pdf)
- NCB Naturalis: *Use Case Birdwatchers*. Use case scenarios involving birdwatchers searching scientific information about in the STERNA portal: [http://www.sterna-net.eu/images/stories/documents/sterna\\_uc\\_birdwatchers.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_uc_birdwatchers.pdf)
- Oomen, Johan (Netherlands Institute for Sound and Vision): *Europeana Use Case*. Use case scenario involving ingesting STERNA data into Europeana: [http://www.sterna-net.eu/images/stories/documents/sterna\\_europeana\\_use\\_case\\_final.pdf](http://www.sterna-net.eu/images/stories/documents/sterna_europeana_use_case_final.pdf)

STERNA has a video channel on Vimeo.com<sup>26</sup> with videos produced by the STERNA partner Salzburg Research: A promotional video each for possible content provider and portal user, as well as six video tutorials about the RNA Toolset.

- *Sterna - Organization's demonstrator*: <http://vimeo.com/channels/sterna#11106978>
- *Sterna - Users' demonstrator*: <http://vimeo.com/channels/sterna#11106680>
- *Chapter 1: Getting started*: <http://vimeo.com/channels/sterna#11733093>
- *Chapter 2: The toolset interface and its basic navigation functions*: <http://vimeo.com/channels/sterna#11733106>
- *Chapter 3: Editing and changing*: <http://vimeo.com/channels/sterna#11733113>
- *Chapter 4: Moving and reordering items*: <http://vimeo.com/channels/sterna#11733132>
- *Chapter 5: Refferers*: <http://vimeo.com/channels/sterna#11733138>
- *Chapter 6: Value mapping*: <http://vimeo.com/channels/sterna#11733146>

### List of STERNA partners

Thirteen European Biodiversity and Natural History organizations have been involved as content providers originally (1 to 13) and five other institutions have been named as Content partners to STERNA (14 to 18)<sup>27</sup>. STERNA partners who are involved in other projects related to Europeana are indicated below: OpenUp!<sup>28</sup> (OU), BHL-Europe<sup>29</sup> (BE), and Natural Europe<sup>30</sup> (NE).

<sup>26</sup> STERNA video channel: <http://vimeo.com/channels/sterna>

<sup>27</sup> See STERNA Website for more information about the partners: <http://www.sterna-net.eu/index.php/en/members>

<sup>28</sup> See OpenUp! Partners: <http://open-up.eu/node/8>



1. Archipelagos, Greece - <http://www.archipelago.gr/> / Wildlife Library: <http://wildlife-archipelago.gr/>
2. DOPPS BirdLife Slovenia, Slovenia - <http://www.ptice.si/index.php>
3. Heritage Malta, Malta - <http://www.heritagemalta.org/>
4. Hungarian Natural History Museum (NE), Hungary - <http://www.nhmus.hu/en>
5. Icelandic Institute of Natural History, Iceland - <http://en.ni.is/>
6. Natural History Museum of the municipality of Amaroussion, Greece - <http://www.mfida.gr/>
7. Natural History Museum of Luxemburg, Luxembourg - <http://www.mnhn.lu/>
8. NCB Naturalis (OU, BE), The Netherlands - <http://www.naturalis.nl/en/>
9. Netherlands Institute for Sound and Vision, The Netherlands - <http://www.beeldengeluid.nl/en>
10. Royal Museum for Central Africa<sup>31</sup> (OU, BE), Belgium - <http://www.africanmuseum.be/>
11. Salzburg Research, Austria - <http://www.salzburgresearch.at/en/>
12. Teylers Museum, The Netherlands - <http://www.teylersmuseum.eu/index.php?item=1&lang=en>
13. Wildscreen/ARKive, United Kingdom - <http://www.wildscreen.org.uk/> & <http://www.arkive.org/>
14. Birdpix, The Netherlands - <http://www.birdpix.nl>
15. Natural History Museum of Mainz, Germany - <http://www.mainz.de/nhm>
16. Xeno-canto Foundation for Nature Sounds, The Netherlands - <http://www.xeno-canto.org>
17. Museon, The Netherlands - <http://www.museon.nl/en>
18. NABO - North Atlantic Biocultural Organization, USA - <http://www.nabohome.org>

### *List of content in Europeana by provider*

- MRAC: [http://www.europeana.eu/portal/brief-doc.html?start=1&view=table&query=europeana\\_collectionName:10103\\*](http://www.europeana.eu/portal/brief-doc.html?start=1&view=table&query=europeana_collectionName:10103*)
- NCB Naturalis: [http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana\\_collectionName%3A10102\\*](http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana_collectionName%3A10102*)
- Heritage Malta: [http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana\\_collectionName%3A10105\\*](http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana_collectionName%3A10105*)
- Teylers Museum: [http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana\\_collectionName%3A10106\\*](http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana_collectionName%3A10106*)
- NL Institute for Sound and Vision: [http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana\\_collectionName%3A10107\\*](http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana_collectionName%3A10107*)
- Mainz Natural History Museum: [http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana\\_collectionName%3A10108\\*](http://www.europeana.eu/portal/brief-doc.html?embedded=&start=1&view=table&query=europeana_collectionName%3A10108*)
- Natural History Museum of Amaroussion: [http://www.europeana.eu/portal/brief-doc.html?start=1&view=table&query=europeana\\_collectionName:10101\\*](http://www.europeana.eu/portal/brief-doc.html?start=1&view=table&query=europeana_collectionName:10101*)

<sup>29</sup> See BHL-Europe Partners: <http://www.bhl-europe.eu/en/partners>

<sup>30</sup> See Natural Europe Consortium: <http://www.natural-europe.eu/en/the-consortium>

<sup>31</sup> In the OpenUp! project the French version of the name of the Royal Museum for Central Africa is used: Musée royal de l'Afrique centrale (Abbreviation: MRAC).



- Icelandic Institute of Natural History: [http://www.europeana.eu/portal/brief-doc.html?start=1&view=table&query=europeana\\_collectionName:10104\\*](http://www.europeana.eu/portal/brief-doc.html?start=1&view=table&query=europeana_collectionName:10104*)

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