Opening Up the Natural History Heritage for Europeana

COMPONENT REPORT

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C5.3.1 - Operational content provision (botany), first report

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0 REVISION AND DISTRIBUTION HISTORY AND STATEMENT OF ORIGINALITY

Revision History

Revision	Date	Author	Organisation	Description
Draft 1	2012-07-06	J. Hoffmann, B. Jacob	MfN, MRAC	
Draft 2	2012-08-10	M. Kempa	IBSAS	Incorporation of changes from WP4 and WP7
Draft 3	2012-08-21	M. Kempa	IBSAS	Incorporation of changes from content providers
3a	2012-09-13	Coordination Team (P. Böttinger, A. Michel)	BGBM	Minor editing

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This deliverable contains original unpublished work except where clearly indicated otherwise.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

Recipient	Date	Version	Accepted YES/NO
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WP5 providers, WP5 leader/coordinator	2012-07-14	Draft 2	yes
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Project Coordinator (W. Berendsohn, BGBM),	2012-09-24	3a	yes

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1 INTRODUCTION

Work package 5 carries out, among other tasks, mobilisation and provision of botanical objects and associated metadata in the OpenUp! project.

The quality check of the object-associated metadata as well as the display of content in Europeana are important tasks in both WP4 and WP5 in order to assure consistent multimedia objects and metadata standards across all content providers and datasets despite the heterogeneous nature of the content (see[1], [2] and [4]).

There are 14 members in work package 5 whose content falls under the botany domain. Despite the fact that Europeana contains much more botany-related objects than zoology-related objects, the significant part of the botanical content is composed of digitised herbarium (dried and flattened) specimens. However, we can also find artwork and photographs from this domain.

The content provision is realised using the BioCASe Provider Software with functional mapping to the ABCD schema. The technical set-up of the BioCASe Provider Software and the mapping of partner's data sources is described in [3] in more detail.

The first part of this document shows the current status of content provision which contains an overview table showing the number of botanical objects being provided per provider.

The second part of the document takes a look at the content itself. It gives a brief description of the objects being provided by the institutions from the botanical domain. This part is structured per provider.

The final chapter summarises the status of content provision and discusses briefly the targets met.

2 STATUS OF BOTANICAL CONTENT PROVISION

2.1 Overview

The current results in content provision are presented in Table 1. It shows the number of objects available through BioCASe and the number of objects successfully harvested by Europeana. Furthermore, the type of multimedia objects per partners is given. The latest harvest of Europeana was performed at the beginning of July 2012. A more detailed overview including all connected data sources per provider is given in OpenUp! Grant Agreement Annex I [5].

Table 1: Botanical content provided by WP5 in month 18 of the project

Provider Acronym	Type of object[1]	Objects via BioCASe[2]	Objects in Europeana[3]
FUB-BGBM	Image	130,462	107,796
NHM	Image	468	0
IBSAS	Image	285	283
NHMW	Image	52,687	46,180
NM	Image	288	288
ETI	Image	33,497	2,139
UCPH	Image	7,304	0
RBGE	Image	173,018	0
UH	Image	80	0
RBGK	Image	263,159	231,320
NCBN	Image	7,379	0
NBGB	Image	29,554	27,389
UT-NHM	Image	2,264	0
LandOOE	Image	81,875	73,253
Total:		**782,320**	**488,648**

[1] According to [5], Part B, p. 23, footnote b

[2] Count of distinct file URLs via BioCASe Monitor Service (http://edit.africamuseum.be/biocasemonitor/). Status: 23 August 2012

[3] Multimedia objects accessible via Europeana at www.europeana.eu. Status: 23 August 2012

2.2 Stages in content provision process

2.2.1 Botanical content provision to Europeana completed

Definition: content provision for OpenUp! completed, currently no updates of data sources expected

Content providers: none

2.2.2 Botanical content provision to Europeana ongoing

Definition: content provision for OpenUp! ongoing, regular updates/ harvests, ongoing connection of new data sources

Content providers: FUB-BGBM, IBSAS, NHMW, NM, RBGK, NBGB, LANDOOE, ETI

Description: successfully harvested by Europeana, with the intention to increase the number of objects being provided.

2.2.3 Botanical content provision to Europeana in preparation

Definition: content provision for OpenUp! ongoing, ongoing test-harvest by WP2

Content providers: UCPH

Description: technical set-up of the provider software finalized and data mapped to the OpenUp! standards, in the process of test-harvesting for Europeana.

2.2.4 Technical set-up and metadata mapping

Definition: content provision for OpenUp! ongoing

Content providers: NHM, RBGE, UH, NCBN, UT-NHM

Description: the technical set-up of the provider software completed and data to the OpenUp! standard mapped, test-harvest is in preparation.

3 BOTANICAL CONTENT PROVISION

This section gives the overview of the content provided. Each provider gives a brief description of their content, gives an example per object type together with information on object on the metadata level, and its view restrictions. Since WP5 deals with botanical objects only, we do not specify domain.

3.1 Freie Universität Berlin, Botanic Garden and Botanical Museum Berlin-Dahlem (FUB-BGBM)

Metadata provision to Europeana: restricted

The Botanic Garden and Botanical Museum Berlin-Dahlem (FUB-BGBM) is part of the Freie Universität Berlin. With its extensive scientific collections of herbarium specimens (3.5 million) of living plants (more than 20,000), DNA samples and seeds, with its laboratories, libraries and galleries it is an important centre of botanical research in Europe and the principal institution of its kind in Germany. The herbarium comprises all groups worldwide, with focus on central Europe, Mediterranean area, South Western Asia, Africa, Cuba, and South America. The BGBM offers in EUROPEANA access to 107,796 (July 2012) high resolution images from 221 countries of its herbarium holdings, the number of digitised herbarium specimens increases permanently.

The first intensively used herbarium was built by C. L. Willdenow who was Director of the Berlin Botanical Garden from 1801 until his death (1812). Because of Willdenow's important and voluminous publications his outstanding herbarium contains very many types and was one of the largest collections in its time, which was fortunately not destroyed in 1943 and is still kept separate (B-W). It contains ca. 38,000 specimens comprising 20,260 species of vascular plants. The Willdenow herbarium is nearly completely available in EUROPEANA. In the general herbarium the material of some plant families, genera, and a few entire special collections escaped the destruction completely or to a great extent; some examples are *Begoniaceae*, *Pandanaceae, Antirrhinum*, collections of cones and fruits, Dingler's Rosa collection. The Pteridophyte herbarium is the single major portion of the General Herbarium in Berlin to have survived the wartime destruction of 1943. The Pteridophyte collection of the Botanical Museum, comprising c. 300,000 specimens, is one of the world's largest herbaria of its kind. The Bryophyte collection now contains more than 280,000 specimens, the most valuable part being that of S. E. de Bridel which is also kept separated from the general herbarium. The Lichen herbarium comprises about 250,000 specimens, the herbarium of Fungi more than 300,000 specimens. The Algae collections comprise 37,000 herbarium sheets, 1000 wet specimens and about 12,000 samples with microalgae.

Important collectors present in the herbarium B are O. Behr, A. J. A. Bonpland, J. F. N. Bornmüller, A. C. H. Braun, J. Clemens, M. Clemens, H. Dingler, K. Dinter, I. Dörfler, G. Follmann, J. G. A. Forster, J. R. Forster, A. Gundelsheimer, P. C. Hennings, G. H. E. W. Hieronymus, F. W. H. A. von Humboldt, E. A. W. Jahn, W. Kirschstein, J. F. Klotzsch, FC. Koch, . A. M. Kuhn, G. Kükenthal, G. Kunze, J. G. F.-X. Lahm, G. Lettau, J. H. F. Link, A. Ludwig, G. H. Mettenius, C. A. J. Milde, T. L. Nees von Esenbeck, T. R. J. Nitschke, A. Peter, C. G. T. Preuss, G. L. Rabenhorst, H. Schack, G. A. Schweinfurth, K. P. J. Sprengel, O. P. Swartz, J. P. de Tournefort, K. Touton, L. C. Treviranus, C. F. E. Warnstorf, H. E. Weber, G. Winter and W. Zopf.

Example in Europeana:

Type specimen of *Bougainvillea spectabilis*, collected by A. J. A. Bonpland & F. W. H. A. von Humboldt in Peru, described by C. L. Willdenow.**:**
http://www.europeana.eu/portal/record/11605/EF116D96CE3F473FB28FA0D27F832DF30616CAD6.html?start=37&query=bougainvillea&startPage=37

Additional information on multimedia object in metadata: Scientific name, collector's name, collector's number, location, collection date, valid determination, type information.

3.2 Institute of Botany of Slovak Academy of Sciences (IBSAS)

Metadata provision to Europeana: unrestricted

Institute of Botany of the Slovak Academy of Sciences currently contributes to Europeana with 283 images of nomenclatural types from its holdings. Type specimens come from the František Nábělek's Iter Turcico-Persicum 1909-1910 collection. Additionally, approximately 3,500 images of non-type specimens included in

this collection will be provided. The collection originates from the area of today's Egypt, Israel, Palestine, Jordan, Syria, Lebanon, Iraq, Bahrain, Iran and Turkey. Specimens in this collection in many cases represent the only records for a given local area and are often referred to in modern floras of these territories. They are often used by monographers working with the genera occurring in these countries. Other type specimens, images of which will be provided, include those by the Czech botanist Alois Zlatník belonging to the genus *Hieracium* as well as other type specimens of taxa described by the former and current employees of the Institute.

Example in Europeana:

Example shows *Onobrychis susiana* of František Nábělek's collection deposited in the herbarium SAV.

http://www.europeana.eu/portal/record/11612/3C1E417E5F3055AC60312A0F2B06114EAA5B9E48.html?start=2&query=europeana_dataProvider%3A%22Institute+of+Botany+of+Slovak+Academy+of+Sciences%22

Additional information on multimedia object in metadata: scientific name, higher classification, collector, locality (description, country, coordinates, altitude)

3.3 Národní muzeum Praha (NM)

Metadata provision to Europeana: unrestricted

The Herbarium of the National Museum is one of the two most important Czech botanical collections and one of the thirty largest botanical collections in the world. It comprises circa 2,000,000 herbarium specimens from all over the world and several tens of thousands of type specimens. The herbarium was founded in 1818 and includes material from mid-18th century through the present.

The material comes from Central Europe, the Balkan Peninsula, Iraq, Iran, Mongolia, Australia and the former Soviet Union. It contains specimens from numerous important plant collectors, e.g. H. Cuming, J. Mayer, J. G. Gmelin, J. F. Drege, C. F. Ecklon, J. M. Hildebrandt, C. G. T. Kotschy, J. Lhotsky, P. M. Opiz, J. S. Pringle, F. R. R.Schlechter, F. W. Sieber, P. E. E. Sintenis, K. P. J. Sprengel, I. Tausch, G. A. Zenker, C. L. P. Zeyher, C. Presl, T. Haenke, J. Soják, E. Hadač, M. Deyl, K. Domin, Ch. G. Lehmann, F. Čelakovský, C. Sternberg and others.

It includes duplicate specimens from collections destroyed in their home herbaria in the past (e.g. duplicates collected by Sellow, Ehrenberg, Zenker and others destroyed during World War II in Berlin). The collection is also very rich in some taxonomic groups; the genera *Potentilla (Rosaceae*), *Rosa (Rosaceae*) and Thymus (*Lamiaceae*) are the best examples.

Example in Europeana:
http://www.europeana.eu/portal/record/11613/9152931FD5D571BFC93A6AF0F1CFC86B8D666829.html?start=2&query=europeana_dataProvider%3A%22N%C3%A1rodn%C3%AD+muzeum%22

Additional information on multimedia object in metadata: scientific name, higher classification, atomised name, collector, locality

3.4 Stichting Expertisecentrum voor Taxonomische Identificatie (ETI)

Metadata provision to Europeana: unrestricted

Since 1990 ETI BioInformatics works with the taxonomic community to develop digital species information and identification systems in the form of e-monographs and e-publications.

For OpenUp! ETI unlocked nearly 40,000 images of plants for WP5. This includes all images of the e-monographs series "Orchids of New Guinea". Many are spectacular and of great use underpinning identification of these organisms. New Guinea has an extraordinarily rich orchid flora, with perhaps as many as 3,000 species. Large parts of this region are still poorly explored or even unexplored, and many orchid species are only known from a single collection. It also includes the illustrated flora of the British Isles, and the series "Plant Resources of South East Asia".

Example in Europeana:

On a remote island in Papua New Guinea, scientists have uncovered the world's only known orchid to produce flowers exclusively at night that die by the next morning.

Of more than 25,000 species in the orchid, only a handful flower in the evening. The new orchid, dubbed *Bulbophyllum nocturnum*, is the first one known whose flowers shrivel and fall off before dawn. Orchid specialist Dr Ed de Vogel from *Hortus Botanicus* in the Netherlands discovered the specimen in a logging area on the PNG island of New Britain during a research trip. He eagerly awaited the opening of its buds, but once they reached the size at which they should have opened, they withered. He took the plant home to figure out what was happening and found the buds actually opened up after nightfall.

http://www.europeana.eu/portal/record/11610/973E2F28EEED79A2C9F290B47E4C0CF278373D3A.html?start=3&query=Bulbophyllum+nocturnum

Additional information on multimedia object in metadata: scientific name, author, locality

3.5 University of Copenhagen, Natural History Museum of Denmark (UCPH)

Metadata provision to Europeana: unrestricted

The first batch of botanical images from UCPH will be about 7,500 herbarium specimen images and metadata from herbarium C (Copenhagen). It will primarily be plant types from Africa, including collections from the historical important collections in the Forsskål herbarium and Issert & Thonning herbarium. They are expected to be available to Europeana mid-autumn 2012.

Example in Europeana: N/A

Additional information on multimedia object in metadata: scientific name, author, locality

3.6 Royal Botanic Garden Edinburgh (RBGE)

Metadata provision to Europeana: restricted

Content Description

To date, August 2012, The Royal Botanic Garden Edinburgh has prepared 170,000 specimens for inclusion to Europeana. This includes 50,000 Type specimens, the remainder concentrate on intuitionally important research areas including the families *Begoniaceae, Zingiberaceae, Compositae* and *Sapotaceae* and also the geographical areas of South West Asia and the Middle East. Many of the geographical specimens are associated with the Flora of Turkey, published by the RBGE between 1960 and 1988 and the Flora of Arabia 1996 and 2007.

Approximately 4,000 images have also been prepared for Europeana, predominantly these are photographs taken of the RBGE living collection.

A small number (80) of Botanical illustrations drawn from both the Living and Herbarium collections, have also been prepared for Europeana.

Example in Europeana: N/A

Additional information on multimedia object in metadata: scientific name, higher classification, collector, locality, (description, country, coordinates, altitude) nomenclatural type designation.

3.7 Royal Botanic Gardens Kew (RBGK)

Metadata provision to Europeana: restricted

As of July 2012, the Royal Botanic Gardens, Kew has made accessible over 170,000 herbarium specimen images and accompanying metadata to Europeana. This number is expected to rise to over 230,000 in August 2012.

The images included in Kew's collection are primarily type specimens and other historically important material from across the spectrum of vascular plant families. The collection includes a special focus on material collected in Africa and Latin America, but with a growing representation of material from other areas of the world. Kew's digital collections include material collected by plant hunters, explorers and scientists of great renown including, to pick just a few, Charles Darwin, Joseph Dalton Hooker and Nathaniel Wallich.

Charles Darwin, author of the seminal work 'The Origin of Species by Means of Natural Selection', was a close friend and confidant of Joseph Hooker – himself a highly reputed botanist, traveller and second official Director of the Royal Botanic Gardens, Kew. The Darwin collections deposited at Kew were made during the second voyage of HMS Beagle, between 1831 and 1836, and include specimens collected in the Galapagos Islands where Darwin is believed to have formulated his theory of evolution by natural selection.

Kew's digital collections include extensive collections by Joseph Hooker himself, including plant material gathered during Hooker's expedition on HMS Erebus, to the Southern Seas and the Antarctic Islands between 1839 and 1843, as well as important collections from northern India and Nepal made between 1848 and 1851.

Nathaniel Wallich was employed as Superintendent of the Calcutta Botanic Gardens from 1817 to 1846. Wallich published major botanical works on the Indian flora, including *Plantae Asiaticae Rariores* (1830-1832). He travelled widely himself on the Indian Subcontinent, to Nepal and Burma. He also supported many plant hunters travelling to the Himalayas. Kew is home to the Herbarium of the Honourable East India Company, also known as the 'Wallich Herbarium' (K-W). Whilst not yet extensively digitised, Kew's contributions to Europeana include a selection of specimens from the Wallich Herbarium as well as extensive collections by Wallich and others collecting on his behalf, which are incorporated into the main herbarium collections at Kew.

Specimens in the Kew digital collections have been collected over a period of over three centuries, with examples dating back to the beginning of the 18th century.

Example in Europeana:

Carex banksii Boott – collected by Charles Darwin during the Voyage of the Beagle in Terra del Fuego in 1833.

http://www.europeana.eu/portal/record/11614/B0044BB74106C3F2B7F9DDC686EAAEB7E2E91CD1.html?query=K000584785

Additional information on multimedia object in metadata: scientific name, atomised name, identifier, higher classification, collector, locality

3.8 National Botanic Garden of Belgium (NBGB)

Metadata provision to Europeana: unrestricted

The herbarium of the National Botanic Garden of Belgium contains about 3 million dried herbarium specimens of plants and fungi from all over the world. It has arguably the largest collection of plant specimens from the Congo Basin, but it also has significant collections from South America. One of the most important is that of Carl von Martius (1794–1868). He was a German botanist who was amongst the first westerners to explore the Amazon basin. Another intrepid botanist, whose collections are kept here, is that of Henri Galeotti (1814–1858). He was amongst a team of botanists who was first to explore Mexico's highest mountain, Pico de Orizaba.

In Africa one of the most significant collectors was Jean Louis (1903–1947) who, in his short life, assembled one of the best collections of plants from the Congo Basin. His specimens were collected with an enormous degree of care with copious details on the plants and their habitats. These specimens are still held up as prime examples to which other botanist should aspire.

These collections are still actively used for research. They are invaluable for the study of plant diversity and ecology. Many specimens have been designated as the type specimen for a species. That means these specimens were used to define what a scientist means by the name they give to a species.

Example in Europeana:

This example specimen from the herbarium of the National Botanic Garden of Belgium was collected by Eugène Bourgeau in Mexico in 1866. The plant is *Bauhinia dipetala*, which is a small forest tree that lives in tropical forest in Mexico and Belize. Its conservation status is classed as vulnerable as the forests it grows in are threatened by logging.

http://www.europeana.eu/portal/record/11608/4EA59BB7586A6BB7F2817DFE2F49765F7852E0DB.html?start=915&query=national+botanic+garden+belgium&startPage=913

Additional information on multimedia object in metadata: scientific name, higher classification, collector, locality

3.9 University of Tartu, National History Museum (UT-NHM)

Metadata provision to Europeana: restricted

Natural History Museum at Tartu University collects and preserves specimens of plant, fungus and animal kingdom, and geological objects in amount of 1,068,677 specimens.

Botanical and mycological collections hold the biggest botanical and mycological collections of Estonia, containing 398,379 plant (vascular plants, algae and bryophytes) and fungi specimens.

The most valuable part in the algological collection is the iconotheca of *Desmidales*, containing ca. 13,000 figures and descriptions of different taxa.

Bryophytes collections contain 22,500 specimens, among them 8,000 from historical collection of E. Russow, K.G. Girgensohn, C.Warnstorf etc.

Vascular plant herbarium holds the most compendious collection of plants collected from Estonia and from territory of the previous Russian Empire. Oldest collections are from the 18th Century, collected by Kühlewein and F. Hohenackeri from Caucasus.

The mycological collections include 78,000 lichen and 13,500 mycological specimens, among them collection of live cultures of 1,566 isolates and type materials for *Thelephorales*, collected by U. Kõljalg. Lichenological collections hold type materials for 26 taxons.

Example in Europeana: N\A

Additional information on multimedia object in metadata: scientific name, collector, identificator, locality (description, biotope, country, coordinates)

3.10 Land Oberösterreich, Oberösterreichische Landesmuseen/Biologiezentrum (LandOOE)

Metadata provision to Europeana: restricted

The Biology Center in Upper Austria represents the largest natural history collection in the federal state of Upper Austria and the second largest in Austria, next to the Natural History Museum in Vienna. The Biology Center contributes zoological and botanical content to the project OpenUp! and was able to provide approximately 73,000 plant images to the project by the beginning of 2012, followed by several hundreds of images of molluscs.

More than 18,000 botanical items show herbarium sheets from the collection of Hans Metlesics (1900-1985). He was living in Vienna and worked as a civil servant, but most of his spare time he spent as a botanist. The specimens were collected throughout Europe and were prepared with great accuracy, which makes the collection quite precious and aesthetic. It is one of the most beautiful collections of European plants worldwide and is quite species-rich. Hans Metlesics was characterized by a deep botanical knowledge, which brought him the appreciation of his European colleagues. Within the herbarium of the Biology Center, one room was adapted to preserve the original cupboards with this collection as well as the notations of Hans Metlesics. With many images of herbarium sheets of mosses, the Biology Center also presents a huge part of its determined moss collections. Thousands of herbarium sheets from the “Rainforest of the Austrians” in Costa Rica are also included in the contribution to OpenUp!

Example in Europeana:

http://www.europeana.eu/portal/record/11603/781FCC7E2302A0697E8E88DB36AAF7FA4CE1AE38.html?start=6&query=osmunda+regalis

http://www.europeana.eu/portal/record/11603/52627D16BF669B5E7548BBE73A17826AC3E25DB5.html?start=3&query=chamaerops+humilis

Osmunda regalis

This specimen of *Osmunda regalis* is stored in the collections of the Biology Center in Linz (Austria). It is the only species of the genus *Osmunda* in Middle Europe.

Did you know that…?

- *Osmunda regalis* is called “royal fern” because if it´s size up to 160 cm?
- It´s roots are used for the production of growing media for cultivated orchids?
- The royal fern is an endangered species because of devastation of its natural habitat?

In ancient mythology, it´s sporangia are said to have magical power?

Chamaerops humilis

This specimen of *Chamerops humilis*, the dwarf palm, is stored in the collections of the Biology Centre in Linz (Austria). It´s the only species of the genus *Chamaerops* and belongs to the family of Arecaceae.

Did you know that…?

- The dwarf palm is widely used as ornamental plant?
- It´s leaf buds are used as vegetables?
- The leaves have been used to make baskets and mats?
- It´s fruits have been used as traditional medicine?
- *Chamaerops humilis* mostly grows in the “garrigues” in Mediterrean areas.

Additional information on multimedia object in metadata: scientific name, atomised name, collector, locality (description, coordinates)

4 OUTLOOK

Currently (month 18), about 540,000 natural history objects are provided by the OpenUp! project (WP4 & WP5) to Europeana[4]. In order to achieve the goal of 600,000 objects in Europeana by the end of the second project year (according to performance indicator 1), another 60,000 objects have to be mobilized in the next six months. Having a number of content providers already in the process of test-harvesting their data (see Description of content – coming soon), it can be assumed that the performance indicator 1 for the second project year will be reached without any problems [1].

A main focus for the coming 12 months will be a thoroughly quality check of the data to connect the rest of the content providers in WP5 to Europeana and to mobilize new content either in the institutions already being partner of the project or by attracting new content providers[1].

5 ACKNOWLEDGEMENTS

Because of the parallel task with the deliverable D12 - C4.3.1 [1] the current document was prepared in a close cooperation with Work package 4, namely Jana Hoffmann.

6 LIST OF REFERENCES

[1] Hoffmann, J., et al., 2012: C4.3.1 - Operational content provision (zoology), first report

[2] Hoffmann, J., et al, 2012: C4.4.1 - Data quality check feedback (zoology)

[3] C5.2.0 - Local botanical provider software and metadata mapping functional for all data sources

[4] C5.4.1 - Data quality check feedback (botany)

[5] Opening up the natural history heritage for Europeana, Annex I - Description of Work

7 LIST OF TABLES

[4] OpenUp! content in Europeana: http://www.europeana.eu/portal/search.html?query=*:*&qf=PROVIDER:OpenUp%21