

ENGAGING NEW AUDIENCES WITH SPECIALIZED DATA

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ABSTRACT

Digital resources such as the Biodiversity Heritage Library require contextualization to reach beyond their target audience. Availability and access are not the problems; rather knowing how to use the materials found is the real challenge that requires guidance. While it is critical to maintain the core user group, it is also important to attract new audiences who may be outside the core scientific audience, and also to include new data. Developing guided access to the rich ingredients is a key priority along with attracting potential new members.

Keywords: communication, collaboration, digital library, biodiversity, libraries, biodiversity heritage library, encyclopedia of life, social media, subject repository, contextualization, data re-use, BHL, EOL

The Biodiversity Heritage Library (BHL) was launched in 2005 as a collaborative project encompassing 10 major natural history, academic and research libraries in the US and UK (Gwinn and Rinaldo 2009). The goal was to digitize ALL the biodiversity literature. To date BHL has added four more US libraries, and four years ago the BHL Europe was founded with 28 participating institutions. Since that time BHL has established partnerships or regional nodes in Egypt (Bibliotheca Alexandrina), Brazil (SciELO), China (member libraries from the National Academy of Zoology and Botany), and Australia, where the Atlas of Living Australia and the Museum of Victoria are the leads. The latest initiative engages libraries in southern Africa, with the expectation of expansion to more African partners. BHL hosted an organizational meeting in Cape Town, South Africa, June 14-15, 2012, to discuss the development of a BHL-Africa. The result of this meeting was a draft concept document and an expectation of an official announcement by early in 2013. The meetings were funded by a grant from the JRS Biodiversity Foundation with the grant covering the costs of the African contingent and six representatives from the BHL-US/UK. The globalization of BHL has increased interest in a mobile version of BHL as well as static "BHL-in-a-Box" for areas with unreliable Internet access. This global BHL is beginning to reflect the IAMSILC membership with a biodiversity focus that includes marine science and oceanography and all the marine species.

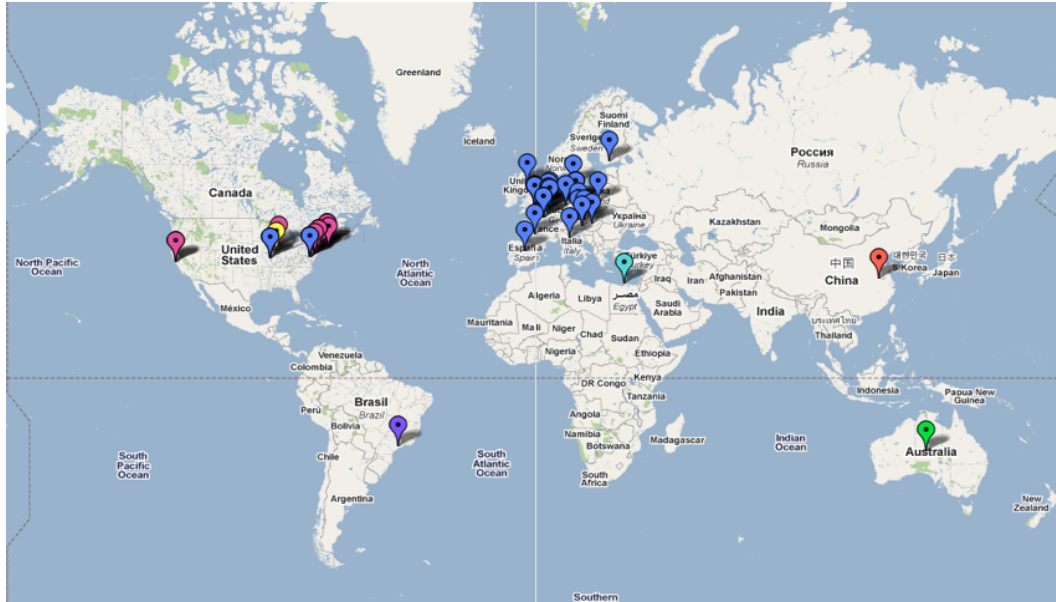


Figure 1. Global coordination across time zones is a challenge.

Now in its seventh year, BHL is a mature service and no longer a pilot project. This paper explores the strategies in use and in development by BHL to make the extensive and multifaceted corpus of biodiversity literature more attractive to a wider audience. Largely driven from the ground up, and without any institutional mandate, the BHL has successfully and organically fostered an organizational model that encourages innovation, user engagement, and global expansion. Availability and access are not the problems; the real challenge is guiding a variety of users to the information they need. While it is critical to maintain the core user group of scientists, specifically taxonomists, there is also intent to attract new audiences outside the core user group. Developing guided access to the rich ingredients is key to expanding the use of a complex resource. The data in BHL is only just beginning to be contextualized for audiences beyond scientists. Ultimately, we would like the audiences to include everyone from those with a casual interest in nature to serious scholars and bioinformaticians.

BHL is a fully global initiative with free access to digitized versions of the biodiversity literature. Information held mainly in North American and European Museums and Libraries is repatriated to countries where the biodiversity is found. BHL makes the information available for scientists, the general public and citizen scientists anywhere in the world. The digital collection has more than 100,000 volumes (over 40 million pages) of books and journals with thousands more added each year. Yet understanding the scientific jargon in much of the literature is beyond the uninitiated, and therefore this rich resource is often unusable. Furthermore, many potential users are simply unaware of the BHL. Using a variety of strategies such as user surveys, crowdsourcing, and other forms of user engagement along with commonly available tools such as Skype, Twitter, Facebook, and Flickr along with other social media tools, the BHL has been able to reach a larger audience and engage users in the presentation and use of the data that forms the BHL (Costantino et al. 2011, Rose-Sandler et al. 2012). Reaching out using social media tools has led to strong support and encouragement from the library and biodiversity communities.

The first and simplest approach to reaching a larger and more diverse audience is to share widely.

The screenshot shows the EOL website interface for the species *Orcinus orca*. The 'Literature' tab is selected, leading to a BHL bibliography. The BHL logo and name are visible, along with a brief explanation of the automated service. A 'SORT BY' dropdown menu is set to 'Year Ascending'. A pagination bar shows page 1 of 21. The bibliography table contains the following entries:

Title	Year	Details	References
Pavli Iovii Comensis medici De Romanis Piscibus libellus ad Ludouicum Borbonium Cardinalem amplissimum. ;	1531	[Basileae]In officina Frobeniana, 1531.	1
L histoire naturelle des estranges poissons marins, avec la vraie peinture & description du daulphin, & de plusieurs autres de son espere / observee par Pierre	1551	A Paris :De l'imprimerie de Regnaud	6

Figure 2. The literature tab on a species page in EOL leads to a bibliography in BHL.

Users can link directly into BHL and also from BHL into EOL. Since users can access species in EOL by using common names (but not consistently in BHL), a wider variety of users can easily discover the information available in BHL.

Social networking engages new audiences. BHL promotes the use of its collection and interacts with users via social networks from Flickr to Pinterest, Blogging, Facebook (complete with quizzes), YouTube and Twitter. Because of the many time zones and people who work on BHL initiatives, such as technical infrastructure, collections-based projects and user surveys, BHL partners and staff depend on Skype for meetings, Google Docs for prose and spreadsheets, a wiki to contain everything BHL from around the globe, and Doodle to enable semi-stress free meeting scheduling.

Blog posts about BHL users feature the impact of BHL's content throughout a wide, interdisciplinary spectrum, from biologists to bibliophiles, to historians, and artists.

TUESDAY, NOVEMBER 20, 2012

Bird Watching & Conservation with Michael Mills



For many of us, leading bird watching expeditions throughout Africa would be a dream job. For Michael Mills, Angola Country Program Manager for the Percy FitzPatrick Institute of African Ornithology, The A. P. Leventis Ornithological Research Institute, and BirdLife South Africa, it's all part of the job. It probably comes as no surprise, then, that

Figure 3. Above is an excerpt from the BHL Blog, an interview with Michael Mills who says: "[BHL] has been a great help with accessing some of the older and more obscure literature, which is often important in the work I do."

The [BHL Flickr](#) page encourages discovery and re-use of captivating natural history illustrations by new users such as artists and teachers. Around 50,000 images are available for viewing and download to anyone. The Flickr pages have received more than 2.5 million views and we receive comments from users who repurpose images for artwork as well as other uses. The images link back into the BHL and also are loaded into the EOL Flickr page once they are tagged.

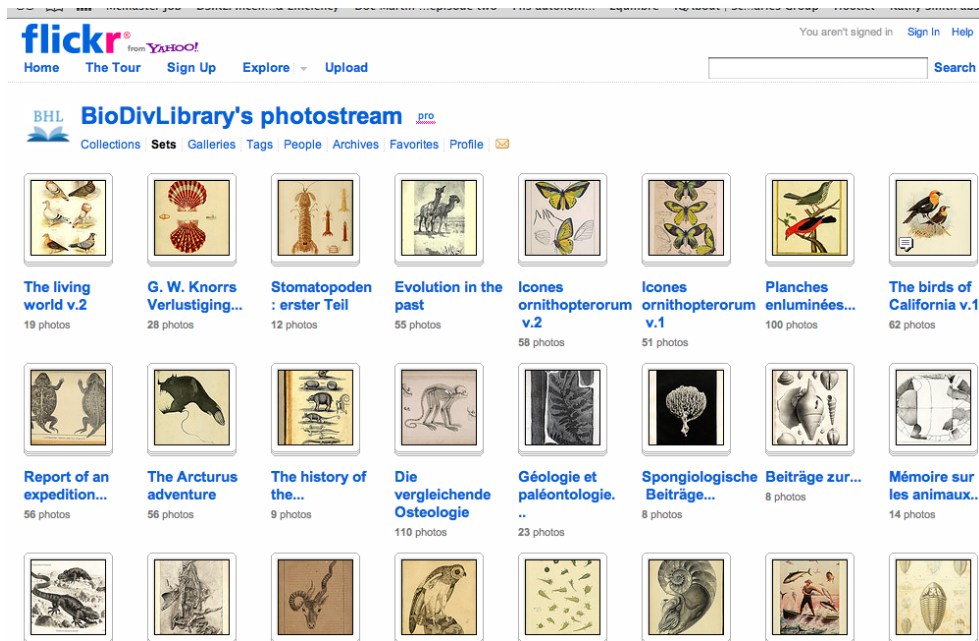


Figure 4. The BioDivLib Flickr pages invite engagement by anyone who wants to see beautiful images of plants and animals.

An NEH grant awarded to BHL colleagues at the Missouri Botanical Garden (with collaborators at the Indiana Museum of Art) in March 2012 is called *The Art of Life: Data Mining and Crowdsourcing the Identification and Description of Natural History Illustrations from the Biodiversity Heritage Library*. The project will develop software tools to automate the identification and description of visual resources contained within the BHL and develop a template to enable the uploading of images from the BHL Flickr account to Wiki Commons. Images that are tagged will also be visible in the EOL Flickr pages, further expanding the potential audience. It is estimated that 2 million images can be added to the Flickr collection with the tools developed with this grant.

In early 2012 BHL launched a new initiative at the behest of Apple, Inc: the Biodiversity Heritage Library on iTunes U. Collections in this venue consist of fewer than 20 items from BHL centered on a theme. Some of the collections include “Charles Darwin’s Library”, “Extinct Species” “Theodore Roosevelt” “Sharks” and a collection that collates some of Carl Linnaeus’s most critical works. This is yet another way to introduce the vast riches of BHL data in a familiar, accessible format to potential users. One of BHL’s first collaborations beyond straight digitization projects was the Charles Darwin Library collection <http://www.biodiversitylibrary.org/collection/darwinlibrary>. Cambridge University, the Missouri Botanical Garden and the American Museum of Natural History collaborated to produce a digitized version of Darwin’s personal library, complete with transcribed annotations and using materials already digitized by the BHL. Selections from this collection became an iTunes collection. One of the features of this collaboration is that not all participants were BHL partners, demonstrating how BHL reaches out to users beyond the core group.

Providing BHL data in different venues is just a beginning and more work needs to be done to put the data in context. An IMLS grant to the California Academy of Science incorporating many BHL partners is called *Connecting Content: a Collaboration to Link Field Notes to Specimens and Published Literature*. The final product will provide a view of the research cycle connecting museum and herbarium specimens with scientists’ field notes, illustrations and the published literature. The content will be incorporated into BHL but the nature of the bulk of the data, unpublished materials and specimens, pushes beyond standard BHL content.

Via BHL-Europe, BHL data is discoverable in [Europeana](#), thus putting natural history information in a cultural

heritage context and in front of a diverse audience. BHL-Europe has developed the Biodiversity Exhibition tool, an application that allows staff to build virtual exhibitions around specific themes. These themes provide highly accessible information such as recipes and cultural uses of spices, or social and cultural information about early explorers. They are information collages that include scientific findings and link out to scientific publications, but do so in an engaging, practical manner that puts the science in context for non-scientists.

The screenshot shows the BHL Expeditions website interface. At the top, the BHL logo is on the left, and 'EXPEDITIONS' is on the right. Below the logo, there's a navigation bar with 'EXPEDITIONS' and 'sort all content by: COUNTRIES LANGUAGES TIMELINE SUBJECTS'. The main content area is titled 'Hudson's voyages (Henry Hudson)' with a 'FIND ME IN BOOKS' button. Below the title, there are three columns: a large image of Henry Hudson in a boat, a smaller image of a ship in a bay, and a red box titled 'Did you know that...?' containing two bullet points. Below these are two boxes: 'Diary' and 'Summary', each with a list of bullet points. The left sidebar contains a list of expeditions including Amundsen's S., Conquering of North, Conquest of Mexico, Discovery of Cent., Expedition to the, Exploration of, Exploration of Tibet, Hudson's voyages, Humboldt, and Mount Everest. At the bottom left, there are logos for BHL, European Union, and social media icons for Facebook, Twitter, and YouTube.

Figure 5. BHL-Europe Expeditions put scientific information in a social and cultural context. Note “Find me in Books” link in the upper right hand corner that will take you to a bibliography in BHL.

A grant submission from MBL/WHOI in collaboration with Arizona State University plans to address the contextualization of articles in the BHL by having undergraduates translate the information for a younger audience. For students, citizen scientists, and naturalists availability and access to the literature are not the problems, since search engines and finding aids work. However the next puzzle is to ensure that users know how to use the materials found and how to make useful the rich cultural diversity of those materials. Understanding the scientific jargon in much of the literature is beyond the uninitiated, and therefore a resource like BHL is unusable for a large segment of the population. The next challenge is to provide the audience of public and student users with guided access to the complex information in collections, and to create and provide a system for others to do the same. The grant proposes to have undergraduate students, graduate students and scholars write inviting “stories” based on facts in the literature that provide enticing entries into the existing materials. Understanding biodiversity is too important to leave to chance. For example, many anticipated health risks caused by climate change are associated with changes in biodiversity (e.g. changes in populations and distribution of disease vectors, scarcity of fresh water, impacts on agricultural biodiversity and food resources, etc.) (Ramanujan 2010). Examples of some of the questions that could be answered using this contextualization method include exploring what species solidified Darwin’s ideas; developing stories demonstrating the facts; changing explanations and impacts of amphibian decline; and tracking decisions by the US Congress to protect species and how species protection changes through time. The primary goal for this body of research is to expose collections and make them useful, compelling

and connected to current events.

Highlighting BHL content that is attractive to users beyond the sciences and engaging users in different venues only scratches the surface of contextualization for broader use. BHL is a very large dataset that includes not only bibliographic information but also beautiful illustrations, text that has been provided by optical character recognition software, and, most importantly, scientific names of organisms that can be used by a variety of disciplines from the humanities to biological systematics. Scientific names are a key access point for biodiversity studies. Taxonomic research requires knowing the first instance of a name in the published literature. Additionally, names may change over time and names can be controversial. Taxonomic names provide an excellent use case for the power of open data (Miller et al. 2012). The BHL partners with the uBio web service, TaxonFinder and along with the rich OCR'd data provides "taxonomic intelligence" for users searching for taxonomic names. Ryan Schenk has taken advantage of BHL's open data by using publication dates of works in BHL to build histograms of the number of publications-per-year, for a species with a name that changes over time. Using the names in conjunction with data from EOL, he provides a visualization of the popularity of names through time (<http://ryanschenk.com/>). Another innovative re-use of BHL data is Rod Page's Biostor (<http://biostor.org/>). The website & web service provides tools for extracting, annotating, & visualizing information from BHL, including extracting the stand-alone articles from the dense journal volumes in BHL.

Global data and global organization require a social infrastructure along with a governance structure. The BHL has rich content and data but what makes it successful and sustainable is that the people and institutions recognize and support the common cause: making the legacy literature of biodiversity available, open and extensive by digitizing and preserving as extensively as possible and opening it up to the world.

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LINKS

Biodiversity Heritage Library <http://biodiversitylibrary.org/>
BHL Blog <http://blog.biodiversitylibrary.org/>
BHL Facebook <https://www.facebook.com/BioDivLibrary/>
BHL Flickr <http://www.flickr.com/photos/biodivlibrary/sets/>
BHL iTunes U <http://itunes.apple.com/us/institution/biodiversity-heritage-library/id467689660/>

BHL Pinterest <http://pinterest.com/biodivlibrary/>

BHL Twitter <https://twitter.com/BioDivLibrary/>

BHL Africa <http://youtu.be/CYTIPSoCI2w>

BHL-Europe video

http://www.youtube.com/watch?v=wFWHA8nlj1M&feature=share&list=FLWw_N9aXGoFzuEAHH8LP_ng

Encyclopedia of Life <http://eol.org/>

JRS Biodiversity Foundation <http://www.jrsbdf.org/v3/About.asp>