SUMMARY: Creating access to digital surrogates of primary source materials has spurred the growth of history of science as a field. Enabling and supporting virtual access requires an understanding of the behind-the-scenes requirements of a digitization project. Using McGill's Taylor White Project as a case study, this article reveals how such a project is managed, to result in a unique digital collection that supports research in both the humanities and the sciences. The workflows described transformed a collection of 938 eighteenth-century natural history drawings from a relatively inaccessible archive to a searchable and browseable digital collection, complete with contextualizing interactive visualizations. Understanding this process reveals some of the ways in which digitized data can create new avenues for questioning and examining information.

KEY WORDS: Digitization, Digital humanities, Digital art history, Metadata, Digital libraries, Digital archives

"Just Put it Online": The Taylor White Project as a Digitization Case Study Emily Zinger, 3459 McTavish St, Montreal, Quebec H3A 0C9, Canada

The classic locus for archival research is often assumed to be a rare book reading room, quiet and full of careful researchers examining fragile materials. While this image is familiar to humanities researchers, it is not, however, a space traditionally associated with contemporary researchers in the natural sciences. As special collections are increasingly made available through digitization, their utility to researchers in multiple disciplines can be enhanced through choices made during the digitization process. Biologists and others working in the natural and environmental sciences are becoming more accustomed to using and benefitting from the legacy literature of natural history, through initiatives such as the Biodiversity Heritage Library (see www.biodiversitylibrary.org). The Taylor White Collection, housed in the Blacker Wood Natural

History Collection at McGill University Library in Montreal, consists of 938 watercolours of birds, mammals, fish, and reptiles dating from the eighteenth-century, along with handwritten notes discussing the taxonomies and origins (in both English and Latin) of the specimens. The drawings were commissioned and annotated by Taylor White (1701-72), a circuit court judge and member of the Royal Society, and form one of the largest extant collections of original natural history illustrations of this period. Although the drawings were never published, the collection is important to the history of science and is the subject of a multi-year research project.¹ Perhaps less obvious is the collection's value to twenty-first-century scientists. Yet from the onset of the Taylor White digitization project, McGill librarians, in collaboration with

¹ The Taylor White Research project, 'Undescrib'd: Taylor White's Paper Museum' was funded by the Social Sciences and Humanities Research Council of Canada (2018). Digitization was undertaken by Digital Initiatives at McGill University Library.

project researchers, anticipated how these near 300-year-old paintings could be useful not only to humanities scholars but could answer research questions beyond those most often posed in a rare book library.

The move toward increased digitization is impacted by users' understanding about what is and is not already online. Search engines that deliver millions of results within a fraction of a second support a false belief that all significant information is online. This appearance of seemingly unlimited search results has altered the way that many users understand information availability. Only a sliver of the world's information is actually on the internet. This is especially true of historic and primary source documents. Undigitized history of science special collections, therefore, risk falling into a form of twenty-first-century invisibility – as Enrico Natale reminds us, information off the web is out of mind.² Putting a special collection online expands the general accessibility of these items to any interested party with an internet connection, no matter where they live, or no matter what impediments to access might exist, including for users who have an accessibility issue that prevents them from using the physical items.³ Putting history of science rare items online also expands the community of users who feel welcome to explore such documents. Some potential users, especially non-traditional users, may not consider rare books reading rooms when selecting relevant resources to their scholarship or personal interests, but the internet does not have such barriers. Once a collection is online, it becomes not only technically available, but also intellectually available to a much broader and more diverse population of

² Enrico Natale, 'Digital humanities and documentary mediations in the digital age', *Digital Archives: Management, Access and Use* (ed. M. Dobreva), pp. 3-22 (Facet, 2018) at p.10.

³ Michelle M. Wu, 'Piece-by-piece review of digitize-and-lend projects through the lens of copyright and fair use,' *Lg. Ref. Serv. Q.* **36**, 51-73 (2017). (http://dx.doi.org/10.1080/0270319X.2017.1359059)

users.⁴ It is not an exaggeration to declare that the long-term future of research in history of science, and in some cases in current research into species distribution, ecology and climate, to name only a few areas, hinges on digital accessibility to a wide array of history of science resources.⁵

Despite the evident advantages of digitized special collections, can an online collection sufficiently mirror the experience of physically interacting with material items to support quality research? The Taylor White Project team at McGill took this concern into account from the onset of the digitization project, making decisions concerning image generation, file types, and metadata to lessen the divide between interacting with physical items versus their digital counterparts. For example, higher quality 'zoomable' images can make viewable online a level of detail beyond what is possible to see with the naked eye. Extensive description of a digital item - including measurements, materials, and date of creation - can help users better visualize how the physical item would look and feel. More importantly, the digital environment enables new ways of 'reading' primary source materials. Over the course of two years librarians and staff worked closely with history of science scholars, art historians, biologists, translators and programmers to build a digital collection that not only meets but surpasses the expectations of researchers online. Using the Taylor White Project as a case study, this article will outline how a collection of rare primary source items can be transformed from physical documents into

⁴ Anna Bülow, Ross Spencer, and Jess Ahmon, *Preparing Collections for Digitization* (The National Archives, Great Britain, 2011).

⁵ H. M. Dee, L. M. Hughes, G.L. Roderick, and A.D. Brown, 'Visual digital humanities: using image data to derive approximate metadata', in *Managing Digital Cultural Objects: Analysis, Discovery, and Retrieval* (ed. Allen Foster and Pauline Rafferty), pp. 89-110 (Facet, 2018).

extensively detailed and described digital surrogates that support innovative research in both the history of science and contemporary natural history.

Many rare book libraries also struggle with an unconscious bias toward the humanities. Because the majority of their patrons tend to be humanities scholars, rare book librarians sometimes overlook the need to make the documentation of their collections relevant to scholars in other disciplines. The Blacker Wood Collection is a legacy natural history collection, so that making the Taylor White Collection accessible and usable by researchers in the natural sciences was an important consideration. Subject headings, for example, had to be discoverable for multiple users from different disciplines. In the case of the Taylor White Collection, a librarian may think to add headings like 'birds in art' or even 'zoology', but may not think about headings which may be more relevant to history of science or natural history researchers, such as 'scientific illustration', 'scientific expeditions', 'ornithology' or even 'natural history'.⁶ In making their materials more likely to be found by those studying humanities, librarians may inadvertently exclude other disciplines from the reading room. More inclusive documentation and finding tools thus can encourage the use of rare and historic materials by scientists in new avenues of research with surprising results. A number of recent projects demonstrate the richness of such multidisciplinary scholarship. One example, highlighted in *The New Yorker*, explores how proteomics - the study of proteins in living things - can shed light on the chemical history of rare manuscripts. For example, when analysing death records from 1630 in the Milan Archives, researchers uncovered traces of carrots, chickpeas and rice, evidence of what the clerks ate when documenting the effects of the plague. When special collections meet this form of analytical

⁶ Lauren Williams (Liaison Librarian for the Blacker-Wood Natural History collection) in discussion with the author, February 2021.

biochemistry they become not just libraries, but bio-archives, according to Michael Whitmore, Director of the Folger Library.⁷ In another instance of such interdisciplinarity, Dr Blair Hedges, a biologist at Penn State University studied the size of wormholes visible in woodblock illustrations. Contrary to their name, wormholes are actually carved by adult beetles when they burrow out to the surface of the woodblocks where they hatched from eggs and lived as larvae. These holes are then visible in the illustrations that are printed into a book using these blocks. Likening the wormhole prints to fossils - evidence of animals that no longer exist - Hedges was able to consult the publication information of the books in which the woodblock illustrations were found and map the historic habitats of the beetles responsible for the wormholes.⁸ These two instances demonstrate that while it is unusual for contemporary scientists to base their research on the holdings of rare books libraries, it is not out of the question. Such research expands the utility of archival materials beyond what is possible in traditional humanities scholarship. With these possibilities in mind, the Taylor White team thoughtfully anticipated the ways in which they could digitize and describe the Taylor White Collection to best broaden the relevancy of these items beyond the humanities.

Digitization

Digitizing a special collection - especially one like the Taylor White Collection whose items are fragile, rare, and oversized - is not a simple a process of scanning and uploading. This type of digitization requires a complicated and lengthy workflow.⁹ The digitized item is not simply a

⁷ Sam Knight, 'Do proteins hold the key to the past?', *New Yorker*, 26 November 2018.

⁸ 'Wormholes from centuries-old art prints reveal history', Penn State News, 20 November 2012, <u>https://news.psu.edu/story/144639/2012/11/20/wormholes-centuries-old-art-prints-reveal-history</u>, (accessed 28 January 2021).

⁹ Joy M. Perrin, *Digitizing Flat Media: Principles and Practices* (Rowman & Littlefield, 2016).

picture of the physical item, but a robustly described digital surrogate that is meant to support extensive research in multiple disciplines.¹⁰ To ensure that this research is possible, information professionals must consider how an item will be stored and described, how it will be organized in a database and how it will be presented via a screen.¹¹ Librarians must decide how this digital file will be preserved in the long-term, anticipating possible changes in technology and user behaviour.¹² Word documents created ten years ago are often un-openable using today's software. By anticipating the dynamic innovations that are inevitable in a digital environment, librarians can make decisions that will protect digitized items well into the future.

The first step in any digitization project occurs even before the scanners are powered on. This is the pre-digitization survey.¹³ Anticipated use of a digital collection guides decisions about the size, type, and quality of digital surrogates generated, so that it is critical to establish these expectations from the beginning of any project.¹⁴ For the Taylor White Project, the Blacker Wood librarian in partnership with a history of science scholar, examined the Taylor White Collection in depth with the overt aim of broadening use of the collection beyond the humanities. The findings of this pre-digitization survey guided the Taylor White team towards a number of decisions throughout the digitization process that improved the collection's findability and usability to traditional and non-traditional users alike. The project grant application anticipated this approach, stating that 'The content of the images and accompanying notes also makes the

¹⁰ Jaimi Parker and Morgan Gierginger, 'Collection and digitization of artifacts in the University of North Texas LGBTQ Archive', *J. of Arch. Org.* **16**, 109-125 (2019) (dhttps://doi.org/10.1080/15332748.2019.1679012).

¹¹ Bülow, Spencer, and Ahmon, op. cit. (note iii).

¹² Joan E. Beaudoin, 'Context and its role in the digital preservation of cultural objects', *D-Lib Mag.* **18**, (2012) (https://doi.org/10.1045/november2012-beaudoin1).

¹³ Eric Michael Wolf and Lauren Gottlieb-Miller, 'The small easy: budget-neutral digital projects at small libraries', *J. of the Art Lib. Soc. Of N. Am.* **36**, 332-344 (2017) (https://doi.org/10.1086/694248).

¹⁴ Alison Cullingford, *The Special Collections Handbook* (Facet, 2016).

White collection a significant resource for evolutionary biologists who mine the legacy literature of natural history for indicators of changes in distribution and adaptation ... the project will identify the subjects according to current taxonomic nomenclature, and reintegrate White's historical data on distribution, size, and behaviour into contemporary scientific records.' This goal recognizes that White's paintings are an untapped resource for evolutionary biologists who are beginning to look to legacy natural history literature for evidence of changes in species distribution and adaptation.¹⁵

The second step in the digitization project is image capture. Though understandably considered the most obvious step of digitization, this work is by no means straightforward. One of the challenges faced by library staff at this stage of the workflow is preservation.¹⁶ While efficiency and speed are important, the digitization of items from special collections must consider protecting easily damaged unique materials. It was critical that the original Taylor White paintings were handled properly to avoid tearing, folding, or otherwise marring the paper. More delicate than the high-quality eighteenth-century paper were the pigments. Gouaches - the painting technique used by White's artists - are particularly subject to flaking and surface abrasion. Careful handling protected the paint, as well as the pencilled titles and notes on the items that are easily subject to smudging. McGill's Digital Initiatives department used in-house equipment to scan all 938 watercolours along with the over 750 accompanying manuscript notes. As White ordered his artists to draw where possible 'size of life', the paper they used is relatively large, measuring on average 56 cm x 39 cm. This size paper could not fit on conventional

¹⁵ The Taylor White Research group included an ornithologist as well as a mammologist, who worked with students in biology to identify the specimens depicted in the drawings by both modern scientific and common names. ¹⁶ Bülow, Spencer, and Ahmon, *op. cit.* (note iii).

scanners, especially since the watercolours needed to be properly supported throughout digitization. The Digital Initiatives team utilized an overhead scanner built specifically for imaging large format items. The Taylor White manuscript notes, which vary in size, were photographed on a book scanner. Complicating matters, some of the paintings had been featured in past exhibitions and were difficult to unframe and remove from mats. The Digital Initiatives team worked creatively to reposition the framed images at an angle and scan them through the glass to capture a clear image while avoiding glare. Thanks to the meticulous work of McGill's Digital Initiatives department, users have the option to view the physical paintings in person, by request in the Rare Books & Special Collections reading room, or can explore both paintings and notes online via the McGill Archival Collections Catalogue.¹⁷

These images created during digitization are referred to as archival masters. The Taylor White team intended from the beginning of this project that the digitized images would be used in the future in numerous ways. Each use would require its own technical specifications. For example, extremely high-quality scans permit the analysis of the minute details of an artist's technique, but a very large file might be difficult for researchers to exchange over email. On the other hand, a digital surrogate small enough to download easily would require that the originals be scanned a second time should higher resolutions files be needed later. Following Cullingford's 'golden rule of digitization: capture once, use many times', the Digital Initiatives staff created a single archival master for each document from which innumerable service copies can be generated.¹⁸ The archival masters are of the highest quality and largest file size reasonable (in this case in TIFF format). This offers librarians the flexibility to create service copies in any number of

¹⁷ https://archivalcollections.library.mcgill.ca/index.php/taylor-white-collection

¹⁸ Cullingford, at p. 116, op. cit. (note xiii).

formats and sizes as needed. Creating a digital copy does not, however, ensure long-term preservation. In fact, digital objects are themselves fragile, in constant danger of degradation. Hardware and software may go out of date and digital files may lose data over time.¹⁹ Floppy disks, for example, were once a mainstay of information sharing and storing. Now their contents are trapped on an obsolete format, largely inaccessible without specialized equipment. Comparing the digital landscape of fifteen years ago with that of today reveals how dynamic this space is. Ultimately, the benefits of digitizing a collection last only as long as the digital surrogates remain accessible to researchers. Digital preservation, therefore, does not end once the images have been created; the McGill Digital Initiatives department continues to perform regular digital curation procedures to maintain the archival masters.

In addition to creating digital images in multiple file formats—including the archival TIFFs and JPEGs for regular download and use—other factors were considered in an effort to meet the anticipated needs of a diversity of future researchers, including creating digital surrogates as similar to the physical items as reasonably possible. For example, following a common digitization recommendation, staff cropped the images outside the edges of the documents themselves.²⁰ For items of historic importance, such as the Taylor White paintings, even something as seemingly unimportant as the edge of the paper can hold valuable insight into the item and its context. This information would be viewable in a reading room and it was critical to maintain it through digitization. Another practice adopted by the Taylor White Project was to

¹⁹ Beaudoin, op. cit. (note xi).

²⁰ Still Image Working Group, 'Guidelines: technical guidelines for digitizing cultural heritage materials', (Federal Agencies Digital Guidelines Initiative, 2016), at p. 19,

http://www.digitizationguidelines.gov/guidelines/FADGI%20Federal%20%20Agencies%20Digital%20Guidelines%20Initiative-2016%20Final_rev1.pdf.

digitize the backs or verso of each item. Many of the paintings have handwritten notes on their versos such as this text in White's hand on the back of the image of a Shag, which reads, 'This bird was shot in y^e Great Frost of 1740 / & I had another sent from Norway where / I suppose it a native' (figure 1). Not all the White paintings have such notes, but even when a document has a blank verso it is still valuable to digitize its reverse. By giving researchers a full view of an item, this practice lessens the gap between working with a physical document versus consulting a digital item. In viewing a painting's blank verso researchers are not left questioning whether or not they have missed critical evidence.²¹ Though this decision nearly doubled the amount of time and work it took the digitization team to create a surrogate of each painting, researchers and library staff consider it worth the effort.

²¹ Parker and Gierginger, *op. cit.* (note ix).



Figure 1. Charles Collins, 'The Shag', verso, 1739. Great cormorant (imm.) (*Phalacrocorax carbo*), Taylor White Collection: MSG BW002, Item 841. Blacker Wood Collection, Rare Books & Special Collections, McGill Library

Metadata and Cataloguing

A digital image alone, however, does not in and of itself create a findable and useable virtual item.²² In order for digital collections to be fully functional, each item must be properly and robustly described using a standardized set of metadata. Metadata refers to information about information and is critical to the back-end management of a digital collection. Item name, creator name, date of creation - these are all common pieces of metadata. The Taylor White research team took an unorthodox approach to metadata creation. In close consultation with McGill Library's Collections Services department, graduate-level research assistants in the fields of art history, history of science (including one doctoral student with a good knowledge of Latin), as well as undergraduate biology students, collaborated to enhance the metadata developed by the librarians. By sharing the labour with student researchers, this unusual cataloguing process allowed for a depth of description that realistically could not have been accomplished through librarian research alone. The students were able to spend over a year transcribing and translating White's manuscripts notes, identifying each specimen and recording its contemporary scientific name and present distribution, plus creating a style guide and conducting an analysis to attribute unsigned works to specific artists. The immense backlog of uncatalogued materials makes this extensive description usually impossible for librarians to undertake for each item in the collection. Under the supervision of the librarian, students completed a spreadsheet created by Cataloguing Services, which ensured that the data could be uploaded into McGill's database in a format recognizable and useful to scholars. Combining interdisciplinary perspectives, the research team built a robust and extensive ontology grounded in language from the fields of art

²² Bülow, Spencer, and Ahmon, op. cit. (note iii).

history, history of science as well as modern science disciplines to contextualize and describe

this collection.²³ Twenty-one unique fields of metadata were collected for each of the 938

paintings and manuscript notes, and standardized according to Collections Services guidelines.

The final areas of metadata created were as follows:

- CN: Craddock number, a unique identifier written on the item in pencil by the antiquarian bookdealer W.J.H. Craddock at the time of purchase by Dr Casey Wood in 1926 (later changed to Item number);
- MS Common Name: Name written on the painting by Taylor White, the artist, or another contemporary;
- Cataloguing Title: Main title by which the item is identified;
- Source of Title Proper: The place from which the main title comes, either from the item itself or from a 2019 species identification;
- MS Mousley Scientific Name: The scientific name attributed to the pictured animal by Blacker Wood librarian Henry Mousley (1865-1949) in the 1930s;
- Scientific Name Contemporary: Scientific name (given by the Integrated Taxonomic Information System) attributed to the pictured animal in 2019 by research team with the collaboration of the Redpath Museum at McGill and Dr Robert Montgomerie, Queens University, Kingston, Canada 2019;
- Statement of Responsibility: Information concerning the creator of the work transcribed from the item;
- Artist: A standardized form of the creator's name;
- Collector: The original collection from which the animal/specimen pictured was sourced (where known);
- Extent: Physical characteristics of the item, including the dimensions;
- Accompanying MS Text: Whether or not there is an accompanying manuscript note that corresponds with the painting;
- Volume: The original volume and item number assigned by Taylor White (written in his hand);
- Date: The date when the item was created, determined from the date on the work, or assigned by the research team in 2019;
- Recto: Handwritten text transcribed from the front of the item;
- Verso: Handwritten text transcribed from the back of the item;
- MS Transcription: Text transcribed from any separate manuscript notes accompanying the item, if applicable;
- Subject Headings: Subject heading terms from Library of Congress Subject Headings which describe the content of the item;
- MS Translation: An English translation of any separate manuscript notes originally in Latin;
- Condition Note: Indicates whether or not an item is framed and details its physical condition;

²³ Research papers produced by the research team are part of a special issue of *Notes and Records* dedicated to the White collection.

• Scope and Content Notes: A free-text, descriptive field which gives additional information on the item, such as origin of the species depicted and uncertain species identification.

From this list it is clear that metadata useful to researchers extends well beyond the standard

categories that support humanities scholarship. By reaching beyond those traditional

descriptions, the Taylor White team built digital surrogates that support extensive research of the

collection from numerous disciplines (figure 2).



Figure 2. Metadata for Charles Collins, 'Long-eared Owl', Item 342. *McGill Archival Collections Catalogue*, <u>https://archivalcollections.library.mcgill.ca/index.php/long-eared-owl</u>

Searching and Browsing

The team created metadata in order to facilitate not simply the use of the collection, but its

discovery. The words used to describe digital surrogates influence how and if these materials are

found online.²⁴ Each piece of information increases the likelihood that no matter what aspect of a document a researcher may be interested in, they should be able to find the Taylor White paintings according to their chosen search terms.²⁵ Cataloguing cultural items at the item-level in this way, however, brings a number of semantic and communication-related challenges.²⁶ The Taylor White team worked to ensure that the metadata were interdisciplinary in nature, meeting the communication standards of several fields of study with interest in the collection. The team also sought to avoid jargon, to prevent researchers in other fields from having difficulty accessing the items. For example, an ornithologist should be able to find all of the bird paintings based on their contemporary common and scientific names. At the same time, a researcher with a general interest in birds could find the collection by searching merely for 'birds', one of the subject headings used to describe these items. The paintings can also be found by searching for the region from which each specimen originated (according to the manuscript notes) or the regions in which the depicted animals live today (identified by the research team and included in the Scope and Content note). One of the impacts of the popularity of search engines is a growing reliance on the relevance-ranked search results. Archives users today expect their search results to be sorted semantically, using keywords such as 'scientific illustrations' and 'natural history' in addition to traditional archival cataloguing information such as creator and date.²⁷ This perspective is reflected in the Taylor White metadata set.

²⁴ Natale, *op. cit.* (note i).

²⁵ Cullingford, at p. 116, op. cit. (note xiii).

²⁶ Pauline Rafferty, 'Managing, searching and finding digital cultural objects: putting it in context', in *Managing Digital Cultural Objects: Analysis, Discovery, and Retrieval* (ed. Allen Foster and Pauline Rafferty), pp. 3-24 (Facet, 2018).

²⁷ Bülow, Spencer, and Ahmon, op. cit. (note iii).

The Taylor White metadata facilitates discovery not only by searching but also by browsing. Searchers have specific needs; browsers, on the other hand, are not necessarily looking for information that can only be answered by an item that matches their exact query. Instead, browsers seek comprehensive results, for a wide selection of related items that fit the overall theme of their query.²⁸ General search terms such as 'Art and science', 'Animals in Art', and 'Zoology,' help to create access points for more generalist library users who might not know to search for 'Taylor White' or the titles of specific paintings when browsing. Cataloguing essentially designates the search terms that will retrieve an item from a database. Librarians cannot, however, assume that users will be able to guess this exact combination of keywords or subjects. It is therefore in the service of users for librarians to create metadata that are both extensive and accurate. The robust metadata describing the Taylor White Collection lessens the likelihood that these items will be relegated to the inaccessible hidden depths of the internet.

Physical vs Virtual Interaction

Advocating for special collections digitization should not come at the expense of promoting the value of physical interaction with primary source documents. The argument for digitization is not counter to research with original materials but is instead centred around increased accessibility and discoverability. Consulting a digital item will never perfectly recreate holding a manuscript in one's hands or viewing a portfolio of paintings spread out on a reading room table. Digital surrogates are binary representations of three-dimensional objects, and the former will only ever be a stand-in for the latter. While local users retain physical access to the Taylor White

²⁸ Pierluigi Felicati, 'Access to digital archives: studying users' expectations and behaviours', in *Digital Archives: Management, Access, and Use* (ed. Milena Dobreva), pp. 121-136 (Facet, 2018).

Collection, online users are usually willing to accept a compromise in their research experience in exchange for remote access. Despite the benefits of digital access, some scholars maintain that digital surrogates cannot effectively stand in for physical items. Walter Benjamin, writing about photographic reproduction in the 1930s, maintained that the surrogate loses its 'aura', the special value traditionally associated with physical items.²⁹ Contemporary scholars, like E. Haven Hawley, assert that what makes an item meaningful, what truly constitutes primary source-based research, is the analysis and interpretation of an item—its re-contextualization.³⁰ Significantly, as L. W. C. Van Lit asserts, using a digital surrogate in place of a physical artefact can give a researcher not a lesser experience, but a different experience.³¹ While certain contextual attributes that may be present in a physical document cannot be seen or experienced online, most digitization retains what is valuable to scholars and provides new avenues to interpretation. For example, the assemblage of digital surrogates allows researchers to order the items in novel ways and in doing so, bring new meaning to the collection. This is analogous to the ordering of the archives as a whole, which Ken Lopez likens to a mosaic.³² Every item is a single tile that cannot be fully understood or appreciated until viewed at a distance that brings the entire picture into sight. Physical consultation allows for minute examination of a single item; digitization of a collection lays out the picture of the whole.

²⁹ Walter Benjamin, cited in Guy Pessach, 'The political economy of digital cultural preservation', in *Digital Archives: Management, Access, and Use* (ed. Milena Dobreva), pp. 39-72 (Facet, 2018) at p. 42.
³⁰ E. Haven Hawley, 'Reflections on the meaning of objects', in *Forging the Future of Special Collection* (ed. Melissa A. Hubbard, Robert H. Jackson, and Arnold Hirshon), pp. 3-10 (Neal-Schuman, Chicago, 2016).
³¹ L. W. C. van Lit, *Among Digitized Manuscripts: Philology, Codicology, Paleography in a Digital World* (Koninklijke Brill NV, Leiden, 2019).

³² Ken Lopez, 'Literary archives: how they have changed and how they are changing', in *Forging the Future of Special Collection* (ed. Melissa A. Hubbard, Robert H. Jackson, and Arnold Hirshon), pp. 95-100 (Neal-Schuman, Chicago, 2016).

This collection mosaic is not, however, the only product of examination in an online environment. The default order presented in a digital archive can be manipulated by the user to reorganize digital items into a new order, revealing differing layers of information. White's collection of drawings can be analysed by year of creation or by the artist who made them. Researchers can look at just mammals or reptiles, or just monkeys and parrots. Though such filtering and ordering may sound obvious to anyone familiar with the internet, these tools have the potential to revolutionize the way that researchers interact with and analyse primary source documents. The default order for the Taylor White online collection presents the paintings in what is most likely the original order intended by White himself, according to the volume and image numbers he inscribed on each work (which is not necessarily their physical organization in the library, where they are stored in archival boxes). This organization not only permits researchers to view the informational and aesthetic content of the items, but simultaneously contextualizes them within the world of eighteenth-century taxonomical research. Users of the digital collection can quickly re-order and view the collection by any of the metadata categories described above. Sorting that would take hours in a reading room occurs in seconds in a digital environment.33

Digital Humanities: Case Studies

Aspects of the Taylor White Project occupy that liminal space in academia referred to as the digital humanities. The digital humanities encompass all research that utilizes digital tools and

³³ John Cox, 'The Abbey Theatre Digital Archive: a digitization project with dramatic impact', *Insights* **30**, 20-30 (2017) (https://doi.org/10.1629/uksg.381).

digitized materials to analyse information in revolutionary ways.³⁴ The discipline is by definition interdisciplinary, encompassing the overlapping and intersecting fields of thought that can exist within any single project.³⁵ By aggregating the quantitative and qualitative data generated from each of Taylor White's paintings, for example, researchers were able to uncover findings related to White's collecting habits and taxonomical interests that could only be easily seen in this digital space. The following two case studies demonstrate how the Taylor White Collection's presentation online made possible not only the work of a historian of science, but also the work of a contemporary natural historian.

Céline Stantina is a scholar of a type likely familiar to most rare book librarians. A doctoral student in history, she focuses on zoological knowledge networks in the early modern Atlantic world and how those networks affected spheres of publication. Having regularly consulted rare materials in her academic career, working with the Taylor White notes and paintings was not outside her usual scope of work. Stantina's research hinged on a single question, what was Taylor White's practice as a naturalist? Since White never published, left behind few letters, and is only mentioned briefly in the accounts of his peers, Stantina was left with the White's manuscript notes and the inscriptions pencilled on the verso of the paintings to uncover the motives and methods of this eighteenth-century collector. Using a dataset consisting of the metadata described above, Stantina searched for and counted the times that White named his sources for classification, such as the *Systema naturae* of Carolus Linnaeus (various editions). Thanks to the work of another member of the research group who transcribed and translated

³⁴ Cullingford, op. cit. (note xiii).

³⁵ Jennifer Brannock, Craig Carey, and Joyce O. Inman, 'Starting from the archives: digital humanities partnerships, projects, and pedagogies', in *Digital Humanities, Libraries, and Partnerships* (ed. Robin Kear and Kate Joranson), pp. 163-176 (Chandos Publishing, 2018).

from the Latin White's manuscript notes, Stantina was able to search the full corpus of White's writings. Based on the chronology, names and references that White quoted across his work, Stantina could reconstruct a network diagram that represented White's social contacts and intellectual framework, as well as recreate a portion of White's lost library catalogue.³⁶

Combing through texts to find names, publication titles, and dates, is a traditional research mode for rare books libraries. But this is not the only kind of research possible. Two members of the research group, biology student Vida Javidi and professor and ornithologist Robert Montgomerie undertook an innovative investigation of Taylor White's birds from the biological perspective. Dr Montgomerie's research typically involves studying the coloration of birds and their eggs. The Taylor White Collection - being the largest known collection of bird paintings to-scale from the 1700s - led him and the research group to wonder if perhaps some of the images depicted birds that are now extinct, or birds that might be previously undescribed in the literature. To answer this question, Javidi and Montgomerie adapted a technique used for studying birds when a scientist does not have access to specimens, allowing them to rate the similarity between the 300-year-old bird paintings and photographs of birds in twenty-first-century field guides.³⁷ They divided each painted bird into five body regions and then scored each region on a scale from one to five according to the similarity of its colours and patterns to the bird images in contemporary field guides, developing a similarity index for White's birds. For the 50 parrots in the collection, they went a step further, superimposing White's birds on top of field-guide photographs to rate not only the similarity of their colouring, but also sizes and body proportions.

³⁶ Céline Stantina (Doctoral Candidate) in discussion with the author, January 2021.

³⁷ P. Martin, R. Montgomerie, and S. Lougheed, 'Color patterns of closely related bird species are more divergent at intermediate levels of breeding-range sympatry', *American Naturalist* **185**, 443-451 (2015) (https://doi.org/10.1086/680206).

By ensuring that the quality of the digitized images was high enough to support such scientific visual analysis, and by including the current scientific names of specimens alongside eighteenthcentury nomenclature, the Taylor White team created a collection and dataset amenable to the unique needs of contemporary biological research. The majority of humanities research projects, even when they have manifest relevance to fields like biology or environmental science, rarely include researchers from scientific disciplines. This oversight limits the familiarity of scientists with legacy scientific literature and its potential use to illuminate contemporary research questions. Dr Montgomerie has worked on the history of ornithology for twenty years and estimates that around 95% of his fellow scientists do not often consult references from before the 2000s, let alone from the 1700s.³⁸ Rare book libraries have an exceptional opportunity to welcome scientists into the fold, to demonstrate the often-unexplored relevance of their collections to fields beyond the humanities.³⁹ This can start even at the undergraduate level. Through a partnership with McGill's Redpath Museum, the Taylor White project invited undergraduate biology students to examine and identify the birds and mammals in White's collection, as training for both field identification and museum documentation. Using early modern watercolours as a pedagogical tool for an undergraduate biology class is not a use case that most rare book librarians might consider for history of science collections, yet this project demonstrates how librarians can think beyond the humanities to find an untapped community of potential users. History of science and contemporary sciences are not opposing disciplines, but complementary. The methods which the Taylor White team utilized to make this collection

³⁸ Dr Robert Montgomerie (Evolutionary Biologist) in conversation with the author, January 2021.

³⁹ Articles discussing in-depth the research of these two case studies can be found within this special issue of Notes and Records.

appealing and useful to diverse research interests serve as a model for how other rare books libraries can promote their holdings without bias to a single discipline.

Conclusion

Digitization of the Taylor White Collection also supported the creation of a website with a browsable digital library linking all 938 paintings to their fully described digital surrogates in the McGill archival catalogue. This site promotes the original research conducted by the team and offers an additional online access point to the collection, reducing the risk of leaving the collection siloed within McGill's institutional archives, while simultaneously providing a space to share the unique digital projects created from these materials. In addition to browsing the collection, users can 'walk through' a virtual recreation of the physical exhibition hosted at McGill Library's Rare Books and Special Collections reading room in the Winter of 2020 (figure 3). Users can analyse maps on which the team geo-referenced both the origins of the specimens that White collected (based on his notes) and their present-day geographical habitats. Using historical gazetteers and Tableau software, the Taylor White team correlated eighteenth-century place names with present day locations, creating a recognizable picture of White's global access (figure 4). Users of this website can also view the social network diagram based on Stantina's research in White's notes to depict the complicated social ties that enabled the collector to gather his specimens and natural history knowledge.



Figure 3. Digital Exhibition, 'Fantastic Beasts and Where to Find Them at McGill'. *Undescrib'd: Taylor White's 18th-century Paper Museum*, <u>https://taylor-white.library.mcgill.ca/?page_id=39</u>.

Historic Specimen Origins



Figure 4. Historic Specimen Origins interactive visualization. Undescrib'd: Taylor White's 18th-century Paper Museum, https://taylor-white.library.mcgill.ca/?page_id=1622.

Digital surrogates can also be used to complement in-person consultation of items. In the winter of 2020 when patrons visited the White exhibition they could view not only a small selection of original artworks on display, but could also interact with the entire collection via an interactive touch table (figure 5). Similar to a massive iPad, the touch table invited viewers to browse and interact with the digital items. Deep zooming capabilities had the power to transform paintings to larger than life size, where miniscule brushstrokes became as large as a forearm. Digitization in this form brought what could not be previously seen with human eyes alone to the forefront of

research into this collection. By placing such technologies alongside the traditional practices of a reading room, patrons were able to explore the items differently and more comprehensively than with paper documents alone.⁴⁰



Figure 5. Intuiface interactive display, 'Birds Volume 1'. *Metadata in the Archives: An Interactive Taylor White Experience*

The significance of expanded accessibility offered by digital collections was demonstrated on 12 March 2020, when libraries throughout Quebec, including McGill, halted in-person use due to the Covid-19 pandemic.⁴¹ Thanks to the high-quality digital surrogates of White's paintings, coupled with their extensive item-level description, the team's research continued largely unaffected throughout quarantine. Since the onset of the pandemic this unexpectedly critical

⁴⁰ Jeffrey P. Emanuel, 'Stitching together technology for the digital humanities with the International Image Interoperability Framework', in *Digital Humanities, Libraries, and Partnerships* (ed. Robin Kear and Kate Joranson), pp. 125-135 (Chandos Publishing, 2018).

⁴¹ Matthew Lapierre, 'COVID-19: Montreal closes public sports facilities, libraries and leisure centres that hold more than 250 people', *CTV News*, 13 March 2020, https://montreal.ctvnews.ca/covid-19-montreal-closes-public-sports-facilities-libraries-and-leisure-centres-that-hold-more-than-250-people-1.4850781

benefit of digital collections has been promoted by libraries across the world, who quickly pivoted to digital in order to maintain continued services for users.⁴² While the Taylor White team did not count 'increased ability to work from home during a pandemic' among the original advantages of putting this collection online, this demonstrates the great value of increasing flexible and remote access to special collections through digitization.

In putting the Taylor White Collection online, McGill dramatically raised the profile of White and his remarkable collection, drawing the attention of scholars who might otherwise never have viewed these paintings. Within the first nine months that the collection was online, the paintings received over 700 views, a statistic well above the number of physical consultations that occurred during the same time frame. The Taylor White project demonstrates not only the practical benefits that come from increasing access through digitization, but also the wealth of new knowledge that can be generated in numerous fields from digitized special collections. As more and more history of science rare materials are made available online, the entire field will be enhanced by the new items, new tools, and new research made accessible for everyone.

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⁴² IFLA, 'COVID-19 and the Global Library Field', 4 August 2020, <u>https://www.ifla.org/covid-19-and-libraries#services</u>. See also Wendy Hanamura, *When An Island Shuts Down: Aruba & the National Emergency Library' Internet Archive Blogs* [weblog], 18 May 2020, <u>https://blog.archive.org/2020/05/18/when-an-island-shuts-down-aruba-the-national-emergency-library/?iax=newsletter052920%7cctalnk</u>

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