INSTITUTE of Museum and Library SERVICES

# Museums for America

Sample Application MA-251634-OMS-22
Project Category: Collections Stewardship and Access

## Yale University (Peabody Museum of Natural History)

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| Amount awarded by IMLS: | $125,645 |
| Amount of cost share: | $125,738 |

The Peabody Museum of Natural History will curate and digitize its collection of histology slides representing the research of Joseph Eastman on Antarctic fishes. The museum will hire three undergraduate student assistants to aid staff in cleaning, scanning, and rehousing slides as well as cataloging and digital data migration. Additionally, museum staff will perform technical analysis on deteriorating mounting media to determine conservation treatment protocols. Staff will present their findings at conferences, and Joseph Eastman will lead a workshop on the collection for Yale students and present a public museum program. As a result of the project, the museum will make high resolution digital images available online for researchers and educators.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of Completion
- Digital Product Plan

When preparing an application for the next deadline, be sure to follow the instructions in the current Notice of Funding Opportunity for the grant program and project category to which you are applying.

**Project Justification**

The frigid waters of the Southern Ocean surrounding Antarctica are among the harshest marine habitats occupied by vertebrates, yet the vertebrate fauna of the Southern Ocean is amazingly rich and highly endemic. The teleost fish fauna of the Southern Ocean is completely dominated by the Notothenioidei, a clade of teleost fishes that comprises over 75% of the species diversity, 91% of the abundance, and 92% of the biomass of all fishes in Antarctic near-shore habitats. This pattern of ecological dominance in the fish fauna by a single closely related clade is entirely unique to the Southern Ocean and is not seen in marine habitats anywhere else in the world. The extent of morphological and ecological diversity exhibited among Antarctic notothenioid species has led to the hypothesis that the clade represents an adaptive radiation. This makes notothenioids one of the few examples of adaptive radiation in marine fishes and a rare example of an adaptive radiation occurring on a continental scale.

In 1978 ichthyologist Joseph Eastman began a research collection to house specimens used in his research on the diversity and evolutionary biology of Antarctic fishes, particularly the notothenioids. Eastman's work has been critical to the understanding of notothenioids as an adaptive radiation. Eastman conducted studies that documented the correlation of skeletal ossification and buoyancy, the discovery and description of new species, and morphological adaptations associated with the production and utilization of antifreeze glycoproteins in Antarctic notothenioids. In 2014 Joseph Eastman donated his complete collection, including fluid-preserved specimens, dried skeletons, cleared and stained specimens, microslides and x-ray films, to the Yale Peabody Museum of Natural History. Over subsequent years, most of the diverse collection was cataloged into the museum's database, EMu, except for the histology slides. Indeed, all the field notebooks and x-ray films have been scanned and cataloged, the latter associated with the catalog records of the voucher. All of Eastman's publications that resulted from the collection have been referenced in the relevant specimen record in EMu, often with additional references to the Archive record for the field notebook. The histology slides have been inventoried and added to the relevant catalog records for the source specimens. The slides, however, have not yet been conserved, imaged, or rehoused.

In 2007 the Yale Peabody Museum of Natural History (YPM) received funding from IMLS to clean, catalog and rehouse 60,000 (7,000 within Vertebrate Zoology) histology slides from three collection divisions (Award #1C-05-07-0166-07). Through this project the museum developed procedures and methods that have become the standard within YPM for microslide curation and conservation. The Vertebrate Zoology slides re-curated with the 2007 grant will be rehoused into larger cabinetry with the proposed project.

The project proposes to rehouse the 7,000 existing Vertebrate Zoology microslide collection (re-curated with the 2007 grant) and to conserve and rehouse nearly 12,000 microscope slides from the Joseph Eastman collection of Antarctic fishes so that they are housed and curated at the same level as the existing collection. The project also proposes to digitize the Eastman microscope slides and add them to an existing virtual microscopy site (https://virtualmicroscopy.peabody.yale.edu/). The slides have significant importance to the scientific community as they were used throughout his career and have been used in published studies (see Appendices 1 and 2). In fact, each of the Eastman slides has already been digitally associated with the cataloged voucher specimen (Appendix 3) and nearly 300 of the cataloged specimens are represented within the Eastman microslide collection. This enables

researchers to compare and examine slides and specimens (many with associated x-ray films) of the same individuals.

Digitizing the slides and making them available through the Internet will facilitate discovery and enable researchers to examine the slides remotely prior to (or perhaps instead of) examining the slides physically, which will reduce risk to the slides themselves. Educators can also use the digital images for teaching activities. The YPM division of Invertebrate Zoology created the virtual microscopy site with funds from NSF (DBI 1349111). From the beginning of this site in 2017, usage of and interest in the microslide images shared there has steadily increased. Usage statistics obtained from Google Analytics have confirmed a steady increase in traffic, not only in first time views but returning views. In fact, during March-June 2020, while schools were closed due to the COVID-19 pandemic, traffic to the site showed a significant uptick. The Invertebrate Zoology division has also seen an increase in virtual loan requests for online access to these scanned microslides and each year several Yale courses utilize the Virtual Microscopy website for teaching. In addition, digitization will allow researchers from the global south to consult the specimens and compare them to their own collections.

The primary problem addressed by this project is the need to digitize and rehouse the slide collection. This will not only help preserve the slides but will enable users to examine the slides without the risks associated with handling. Furthermore, some of the slides are at risk of deteriorating due to the mounting medium used and imaging them now may be the only opportunity to preserve their content. Researchers and educators will benefit from this project, and it will enable additional studies of Antarctic fishes. This project will address the goals of the Museums for America program and align with the project category by improving collection storage conditions and the electronic records for the microscope slides while also increasing the accessibility of the collection to the public through proper collection storage record-keeping and digitization.

Currently, the slides are stored in plastic and wooden microscope slide boxes of different kinds (Figure 1). These boxes are housed in cardboard shipping boxes or banker boxes and stored on the top shelf in one of the museum's fluid-collection storage rooms (Figure 2). Inspection of the cardboard boxes reveals that some of the microscope boxes are stored vertically and others horizontally, making some of the slides lay vertically rather than flat (Figure 3). As part of our previous major microscope conservation and rehousing project, it became policy of YPM to store slides flat to reduce risk of the cover or subject material slipping from the glass due to gravity. Because of this, YPM worked with Delta Designs to develop a cabinet that can store slides in a flat position rather than vertically. In addition, the current microscope slide boxes should be opened carefully because with so many kinds of boxes that open differently, there is currently risk of opening a box upside down, and the slides coming off their current slots and falling. The museum's conservator produced a condition report that included around 20% of the slides, where the major issues can be observed (Appendix 4).

The slides are mostly in good condition, with some experiencing degradation. Most of the slides have been mounted with a medium and a coverslip, but there are some examples of histological cuts placed directly onto the slide, with no medium or coverslip, which renders them more delicate. It is likely that there are two mounting media presents on the slides. One of them is a clear, unknown medium that has not aged well and separated the histology cuts from the slides, keeping them on the coverslips. This issue may not seem as problematic as other degradation processes because the medium is still clear and the cuts are still visible, but it is a severe dissociation risk, especially with the slides

stored vertically and the risk of opening the boxes upside down. Currently, any information the slides have is on the slide itself, and there was at least one instance during condition reporting in which a coverslip with cuts was found separate from its slide, and not in its proper slot (Appendix 4, Fig.3c). Dissociation issues will have to be resolved during curation, under a microscope. In addition, the museum's conservator will aim to identify the problematic clear medium using Fourier Transform Infrared Spectroscopy (FTIR), available at Yale's Institute for the Preservation of Cultural Heritage (IPCH). After identification of the medium, a method will be developed to remount or re-adhere the coverslips to their corresponding slides.

The second mounting medium present is likely Permount, due to the degradation observed. Permount is composed of a pinene resin, a solvent (mainly toluene) and a plasticizer, and has very poor aging properties. Some histological cuts are no longer visible under the microscope due to the milky white degradation of the medium (see Appendix 4). There is no fix for this degradation other than remounting of the slides, which in the case of histology cuts, is complex, very slow, and hazardous from a health and safety point of view, due to the need to use toluene as a solvent. For this reason, digital scans can become an important tool to preserve the information on the slides that have not deteriorated completely yet if remounting is not a possibility.

All electronic records are made available via local Yale University discovery portals (e.g., http://peabody.yale.edu/collections/search-collections) and via external biodiversity data aggregators such as iDigBio (https://www.idigbio.org/) and GBIF (https://www.gbif.org/). All digital images are similarly ingested into the campus wide NetX/Preservica digital asset management and preservation systems. Additionally, images of slides will be shared with the public via the Virtual Microscopy site hosted by the Peabody Museum of Natural History (https://virtualmicroscopy.peabody.yale.edu/) which allows users to examine high-resolution images of microscope slide images. This site has users that are mostly educators and utilize the slides for courses, and is a project previously funded by NSF.

## Project Work Plan

### Phase 1- Purchase and Installation of Storage Equipment

During a previous IMLS-funded microscope slide curation and conservation project, Delta Designs worked with YPM staff to develop special cabinets to house microscope slides with permanently mounted specimens. These cabinets were cubical in shape and fit inside standard specimen cabinets. Subsequently Delta Designs has modified the original model into a stand-alone cabinet which can house more than 18,000 standard-sized microscope slides (75mm x 25mm). These steel cabinets have powder-coated finishes and locking doors with gaskets. Cabinets have water-tight tops with powder-coated pull-out aluminum slide trays. The trays keep the slides flat with small tabs to hold each slide in place. Funding is requested for two such cabinets to house the Eastman slide collection and the previously curated microscope slide collection (currently housed on the floor of a collection storage room) so that all the Vertebrate Zoology microscope slides are housed in improved cabinetry.

The cabinets will be installed in one of the environmentally controlled collection storage rooms at Yale's West Campus and will be stationary cabinets.

The project requires two new cabinets as approximately 60% of the 7,000 existing slides are of atypical dimensions such that, in some cases, only a few slides fit within an individual tray. We will reuse the existing trays for the 7,000 slides previously curated and simply transfer those trays to new

cabinetry. Many of those trays were custom-built to fit the atypical slides. Given the quantity that is atypical, the 7,000 existing slides will nearly fill one new cabinet. The second cabinet, with new trays, is needed to accommodate the Eastman microscope slides.

**Phase 2 – Cleaning, Curation and Database Entry**

Previously curated microscope slides will be transferred to the new cabinets in their current trays without the need to handle or manipulate the slides. Some of the cases in which the slide collection is presently housed will be modified for slide transportation so that slides can be safely transferred to conservation or digital scanning facilities.

A method for cleaning and cataloging each slide was developed during the previous IMLS-funded project in which approximately 60,000 slides were cleaned and rehoused. Continuing with best practices developed by the previous conservator, the Peabody Museum is conservative in its approach to the treatment of its collections, being always aware of their research potential. The cleaning methods to be used were initially chosen because they are effective while minimally invasive. Slides are cleaned with a slightly wet swab (blotted after wet) with distilled water. The swab is rolled over the slide on both sides and then the slide is placed on an absorbing surface (blotter paper or Kim wipes) and the top is carefully pat dried with a wipe. The cleaning process requires approximately one minute per slide, although some slides, due to their condition, may take longer to clean and assess. In the case of the slides in this project that were mounted in Permount, those with more degradation and dried mounting medium ringing the coverslip will take longer to clean and this information will be tracked with the slide's condition. Those that have separated from the slide will be cleaned and prepared for remounting.

As part of the conservation effort, samples will be taken of problematic mounting media for identification via Fourier Transform Infrared Spectroscopy (FTIR). In the case of the ones likely mounted with Permount, samples will be taken of the areas where there is medium outside the coverslip, to avoid unmounting, which could produce damage. In the case of the unknown medium, samples will be taken from the already detached coverslips, from in-between histology cuts or from any residue that could be left on the slides. FTIR is a technique that requires very small sample sizes (often a few micrograms suffice), diminishing the risk on the slides. Once the unknown medium has been identified, a protocol for re-adhering the coverslips to the slides will be devised (see Appendix 4 for more information). Finally, any broken slides will be repaired using Paraloid B72 in acetone in areas where there are no histology cuts. Paraloid B72 will be tested for its refractive index to see if it can serve as an adhesive for any slides that have broken through histology cuts and as a remounting adhesive for detaching cover slips.

The process of rehousing (including reading each slide label, locating, and verifying corresponding specimen records in the database, adding slide storage location information as necessary and physically re-housing the slide) averages 2.5 minutes per slide. Cleaning takes an average of 1 minute per slide. Because of previous work with the Eastman collection, all the slides are already recorded within the database and associated with relevant voucher specimens. Additionally, most microscope slides are part of a series made from the same specimen. Therefore, data entry primarily will involve annotating an existing record through the addition of the specific microscope slide information to the EMu record and adding information on the physical location of each slide (i.e., cabinet and tray number). When multiple slides have been made from a single specimen, the EMu data model easily

tracks the relationship of whole and derivative parts, including unique physical locations for each derivative. Slides that are not derivatives of cataloged specimens have been cataloged so that each slide, or slide series, is recorded in the database. Clear thermal-printed labels with the catalog number will be adhered to the slides as needed. However, in most cases, existing numbers on each slide will suffice for object identification. Those numbers will be recorded in the database along with the specific physical location of the slide bearing that original number. Most of the data records already exist in EMu, thus, the time taken per slide will be reduced and by estimation, the entire process, including cleaning, will average 3-4 minutes per slide.

PI and Co-PI will present at two conferences during Phase 2: Meeting of the Society for the Preservation of Natural History Collections (in San Francisco, CA 28 May-2 June 2023) and the Joint Meeting of Ichthyologists and Herpetologists (in Norfolk, VA 12-16 July 2023). Joseph Eastman will visit the museum to present on his work in the spring semester of 2023; his presentations will be recorded and made available via online platforms, including the museum's YouTube channel.

**Phase 3 – Imaging and Digital Asset Management**

Once cleaned and entries updated in the database, the slides will be scanned. Slides content images will be made using a microscope-based slides scanning system customized for an Olympus BX51 microscope utilizing Nemarski optics (Differential Interference Contrast), outfitted with a Fast 1494 QICam digital camera (QImaging ®). DIC imaging is essential to increase resolution detail when historical, often unstained slides are scanned. Lateral (XY axis) and vertical (Z-axis) stage movement of a two-slide cassette is controlled by the Oasis automation control system (Objective Imaging Ltd.) directed by Surveyor © 8.0.0.2 image acquisition software. Image content will be "snap-shot" images to show a slide content vignette, rather than full-slide scan; this ensures not only useful content, but the high-throughput necessary to allow the project to be accomplished within the funding period. A six-by-six tile area will be selected in a region of interest, and the resulting scan will be saved as a 2048 x 1816 level 8 JPEG. Minimal post- processing will be done other than routine batch adjustments (e.g., lightening, darkening) in Adobe Photoshop CC © on an ad hoc basis. Saved images will all bear an embedded object ID based on the divisional catalog number assigned to the object voucher from which the slides were derived. Batch routines will permit weekly uploading of large sets of images to the EMu Museum collections management system for creation of multimedia files that will be linked to object records. Once images are linked, within a 24-hour window the images are "harvested" by automated routines managed by the Systems Office and sent to the Yale discovery portals for dissemination as well as to the digital asset/preservation systems for archiving. Images generated through this process are freely downloadable in a variety of user selected resolutions. Each of the nearly 12,000 slides will be scanned into 2048 x 1816 level 8 JPEG files as described; a process that takes approximately 4 minutes per slide. 500 slides will additionally be scanned at a higher resolution for use in the Virtual Microscopy site. These 500 high-resolution scans will include at least 1 slide per cataloged lot (see Appendix 3) with additional scans performed on more compelling slides for up to 500 high-resolution scans. Each high-resolution scan takes an average of 30 minutes.

Previously developed workflows and processes necessary to complete this project allow the maturity level to be "mainstream". Major risks associated with the project are broken slides or dissociation of slides from specimen data. During our previous work with microscope slides the risk of

breakage was minimized by careful attention and the use of Ethafoam sheets for platforms for the slides at any point so that the slides are not resting on hard surfaces while work is performed. Damage during moving between labs, or from lab to collection, can be minimized by adding Ethafoam sheets between the trays in the microscope slide cabinet and using carts with rubberized wheels. Careful attention to detail and prioritizing labeling the slides early in the process (together with repairing the dissociating ones) minimizes the risk of losing association with specimen data.

The project is planned and will be implemented and managed by Gregory Watkins-Colwell (GWC), who also served as a PI on the previous microscope slide project funded by IMLS. The day-to-day work on the project will be undertaken by 3 student employees under the supervision of GWC, Mariana Di Giacomo and Eric Lazo-Wasem (for post-processing the slide images). All students will receive EMu and collections handling training from GWC. One museum support staff member will be used for two summers to perform all scanning and most post-scan processing and uploading. This staff member has extensive experience in digitization and using the collection database and will work closely with GWC and Eric Lazo-Wasem. Lawrence Gall will work with GWC to develop digital workflow and will oversee data importation into EMu.

The project sequence is presented in the attached timeline (Figure 4). The proposed project relies heavily upon student employees which aligns with goals of both Yale University and the Peabody Museum. This project will track progress toward achieving the intended results by having monthly assessments and setting milestones for individual staff, including student workers and museum support staff.

All digital assets will be disseminated via campus discovery portals and external biodiversity data aggregators as noted above in Section 1.

**Project Results**

There are several positive impacts of this project. The majority result of this project will be to significantly improve the collection storage and care through upgrading storage conditions and accessibility of the microscope slides, helping to ensure their long-term preservation while making them more readily available for study and research. They will be removed from suboptimal conditions, cleaned, imaged, and moved to modern museum storage equipment and maintained in an environmentally controlled storage room. These actions will help protect and preserve the microscope slides by bringing their storage conditions in line with best practices.

Updating the collection electronic records with storage locations for each slide will significantly improve collection management. This will help maintain intellectual control over the material as well as ensure that the records within the EMu database are accurate and complete.

Several audiences will benefit from this project including scholars from around the world who conduct specimen-based research at the scale of microscopy. Digital imaging of slides will be accessible to scholars and to the public through several venues including the museum's web site, the Virtual Microscopy site, and the university's discovery portals. It will be possible for scholars anywhere with internet access to see detailed images of the subject matter on each microscope slide, thereby facilitating research and public access. The project will also benefit faculty and students who utilize microscope slides in teaching, the public who can examine these microscope slides online, and the staff

who manage the collections. This project will make it easier to find specific microscope slides for study, educational and management purposes.

Microscope slides will be easier to find in new cabinetry and will therefore be subjected to less handling. With similar projects in the past, a greater interest in the collection, as indicated by increased loan requests or collection visits, has resulted following the project.

As with previous rehousing and re-curation projects, this project will be publicized by the museum's web site and in university publications. The Peabody Museum gives collection tours to the public and to Yale courses and re-housed collections always feature highly in those tours. The project will be the subject of a poster or oral presentation at a meeting of the Society for the Preservation of Natural History Collections and the Joint Meeting of Ichthyologists and Herpetologists, thus not only sharing our efforts to re-curate and image these collections, but to also alert researchers that the microscope slides are available for study. All aspects of the project will improve the storage conditions of the microscope slides, ensuring their long-term preservation while increasing their accessibility for the future.

Benefits of this project will be sustained by the Peabody Museum's faithful adherence to the development and maintenance of Best Practices. The museum recently hired a new Head of Biodiversity and Informatics Research and is now a Core Member of the Global Genome Biodiversity Network. The museum is active in multiple digital collaborations and consortiums including EMu Users Forum. Maintaining both collection access and digital data are priorities of the Yale Peabody Museum. These activities demonstrate a philosophy that will ensure the project benefits will be sustained into the future.

| Task | 2022 | | | 2023 | | | | | | | | | | | | 2024 | | | | | | | |
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| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
| **Phase 1** | | | | | | | | | | | | | | | | | | | | | | | |
| Order cabinets | | | | | | | | | | | | | | | | | | | | | | | |
| Install cabinets | | | | | | | | | | | | | | | | | | | | | | | |
| Hire student employees | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| **Phase 2** | | | | | | | | | | | | | | | | | | | | | | | |
| Unpacking and rehousing | | | | | | | | | | | | | | | | | | | | | | | |
| cleaning | | | | | | | | | | | | | | | | | | | | | | | |
| FTIR of mounting media | | | | | | | | | | | | | | | | | | | | | | | |
| Slide repair and remounting | | | | | | | | | | | | | | | | | | | | | | | |
| Presenting at conferences | | | | | | | | | | | | | | | | | | | | | | | |
| Joseph Eastman presentation | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| **Phase 3** | | | | | | | | | | | | | | | | | | | | | | | |
| Scanning & Post processing | | | | | | | | | | | | | | | | | | | | | | | |

**DIGITAL PRODUCTS PLAN**

The Yale Peabody Museum operates a single centralized collection management system (CMS) solution for all eleven of its curatorial Divisions. The present Peabody CMS is EMu from Axiell Ltd. and is currently populated with 6.5 million database records representing circa 68% of the museum's estimated 13+ million specimens and artifacts. In addition to managing all aspects of specimen and artifact records and their use (e.g., accessions, loans, events), EMu has a native GeoLocate georeferencing interface, and native digital library that is scalable to future growth and can store images, video, audio, documents, archives, and similar assets with relevance to museum objects. Metadata in the Peabody EMu CMS adhere to Darwin Core, Audubon Core, GBIF Georeferencing, IIIF Imaging and related community standards. The CMS is hosted on a pair of Oracle X6-2 x64-class servers, with content archived nightly to a university wide enterprise Code42-Crashplan backup service.

For this project, images of the Eastman slides will be made using a microscope-based slide scanning system customized for an Olympus BX51 microscope utilizing Nemarski optics (Differential Interference Contrast: DIC), outfitted with a Fast 1494 QICam digital camera (QImaging). DIC imaging is essential to increase resolution detail when historical, often unstained slides are scanned. Lateral (XY axis) and vertical (Z-axis) stage movement of a two-slide cassette is controlled by an Oasis automation control system (Objective Imaging Ltd.) directed by Surveyor 8.0.0.2 image acquisition software. Image content will be "snap-shot" images to show a slide content vignette, rather than full-slide scan; this ensures not only useful content, but the high-throughput necessary to allow the project to be accomplished within the funding period. A six-by-six tile area will be selected in a region of interest, and the resulting scan will be saved as a 2048 x 1816 level 8 JPEG. Minimal post- processing will be done other than routine batch adjustments (e.g., lightening, darkening) in Adobe Photoshop CC on an ad hoc basis. Saved images will all bear an embedded object ID based on the divisional catalog number assigned to the object voucher from which the slides were derived. Batch routines will permit weekly uploading of large sets of images to the EMu Museum collections management system for creation of multimedia files that will be linked to object records. Once images are linked, within a 24-hour window the images are "harvested" by automated routines managed by the Systems Office and sent to the Yale discovery portals for dissemination as well as to digital asset/preservation systems for archiving (see below). Images generated through this process are presented as IIIF assets which are freely downloadable and can be manipulated dynamically for varying purposes. Each of the nearly 12,000 slides will be scanned into 2048 x 1816 level 8 JPEG files as described. In addition, 500 slides will be scanned at a higher resolution for use in the Virtual Microscopy site maintained by the Peabody Museum. Basic post-processing for image/background cleanup will be conducted on an as needed basis in Adobe Photoshop (Creative Cloud). These digital images are also subsequently loaded to EMu using existing script-based batch loaders and linked to the associated specimen metadata records.

Images and related multimedia items entered in EMu are automatically mirrored to a digital asset management system (DAMS; system is NetX) that is connected to a digital preservation repository (DPRES; system is Preservica). The DAMS-DPRES utilizes a high-performance storage network with geographically separate and replicated data warehouses and off-site vaulted archives. The DAMS-DPRES infrastructure is a holistic solution for securely managing and preserving the digital assets of Yale's museums and libraries. The DAMS-DPRES is administered by the Yale Cultural Heritage Information Technology (CHIT) initiative of the Office of the Vice Provost for Collections and Scholarly Communication. CHIT is a robustly funded long-term partnership, with current members including the

Peabody, the Yale Center for British Art, the Yale Art Gallery, the Yale University Library system, Information Technology Systems, and several other campus departments and institutes.

The Peabody has in place automated procedures to deliver metadata and associated assets from the EMu CMS to public-facing services and portals. These procedures run nightly, so that additions and updates to Peabody metadata and assets that are made internally are published on a near real-time basis. The services to which EMu connects directly include: an Integrated Publication Toolkit (IPT) that is harvested by iDigBio and other aggregators; local collection search interfaces for the eleven Peabody curatorial Divisions; a campus-wide collections discovery service that amalgamates Yale's cultural heritage holdings; and the internal DAMS-DPRES repository noted above.

Each of the images from the nearly 12,000 slides scanned, including their metadata, will be made available under a Creative Commons CC0 dedication, following internal museum best practices and policies, and Yale University's policies on Open Access and appropriate computing.