

Science and Technology Resources on the Internet

Digitized Archival Primary Sources in STEM: A Selected Webliography

Amy Jankowski

Life Sciences Librarian

University of New Mexico

Albuquerque, New Mexico

ajankowski@unm.edu

<https://orcid.org/0000-0002-1189-6338>

Table of Contents

[Introduction](#)

[Definition of Terms](#)

[Opportunities for Instruction & Curricular Integration](#)

[Archives as Sources in STEM Research](#)

[Scope and Methods](#)

[Resource List](#)

[Biology & Natural History](#)

[Chemistry](#)

[Computer Science](#)

[Engineering & Technology](#)

[Environment, Forestry, & Agriculture](#)

[Medicine](#)

[Physics](#)

[STEM General](#)

[References](#)

Introduction

Popular connotations of archives and special collections are most closely aligned with the arts and humanities fields, with history being the most seamless affiliation. However, archival documentation extends far beyond common disciplinary assumptions, with strong holdings relevant to the sciences, technology, engineering, and mathematics (STEM) fields, as well as medicine and other allied disciplines. These archival collections provide largely untapped educational, enrichment, and research opportunities for STEM students and researchers.

Given the profound influx of digitization during the last two decades, many archival primary source materials have been digitized and are now freely available online, with more assuredly in progress. This digital content is in large part unique, oftentimes representing digital surrogates of the only tangible copy of a document,

image, object, or unique assemblage of materials ever created. An intrinsic value in archives is their uniqueness in addition to their authenticity, diversity, breadth, and depth of documentation. Digitized archival collections can serve to supplement an institution's physical archival holdings, if available, as well as make particularly unique or historically significant physical collections (i.e., the papers of Charles Darwin), once limited by geography, easily accessible to librarians, archivists, researchers, educators, and students around the world.

Accessibility and findability of digitized archival resources can be a challenge, particularly for students or researchers not familiar with archival formats and digital interfaces, which adhere to different descriptive standards than more widely familiar library resources. Numerous aggregate archival collection databases exist, which provide a means by which to search across collections from many institutions. However, no single database is comprehensive, and many also lack robust capabilities for subject-based browsing to target STEM collections. The selected resources in this webliography are intended as a starting point by which librarians, archivists, educators, and students may discover digitized archival primary sources related to STEM and allied disciplines, which may be creatively used as tools to inform instruction, teaching, research, library collection development, marketing, and reference services. The resources embody a wide-ranging selection of noteworthy, historically significant STEM-focused archival primary source collections currently digitized and publicly accessible.

Definition of Terms

In the interest of clarity, the framework around which the term "archives" is discussed throughout this article refers to the description as defined by the Society of American Archivists' *Glossary of Archival and Records Terminology* as, "Materials created or received by a person, family, or organization, public or private, in the conduct of their affairs and preserved because of the enduring value contained in the information they contain or as evidence of the functions and responsibilities of their creator, especially those materials maintained using the principles of provenance, original order, and collective control; permanent records" ([Pearce-Moses 2005](#)).

The term "archives" typically refers to collections of primary source materials, though it is possible for archival collections to contain secondary source documents, such as mass market published resources with significance to a collection's subject. The phrase "primary source" is defined by the Society of American Archivists' *Glossary* as, "Material that contains firsthand accounts of events and that was created contemporaneous to those events or later recalled by an eyewitness" ([Pearce-Moses 2005](#)). These materials often include personal writings and records, unpublished manuscripts, correspondence, vital records, institutional records, reports, manuscripts, data, images, artwork, audiovisual resources, and associated artifacts. Archives are significant in part due to the uniqueness of primary source materials contained within, but also due to the complex and subtle inferences made through the collective existence of and relationships between such materials, greater historical context, and provenance.

These archival material relationships are best understood through the lens of collection arrangement in adherence to the principle of "original order," defined as, "The organization and sequence of records established by the creator of the records" ([Pearce-Moses 2005](#)). In this sense, archival collections are not solely of value at the item level, but also through complex contextual interpretations of a creator's intended material arrangement, items' inferred significance, and the associated workflow, thought processes, and intellectual connections that provide an intimate view into a creator's perspective. In a similar vein, the principle of "provenance" is defined as, "The origin or source of something" or "Information regarding the origins, custody, and ownership of an item or collection" ([Pearce-Moses 2005](#)). The clear communication of archival provenance is essential in conveying a collection's context of creation and authenticity.

Furthermore, it is also advantageous to gain an understanding of traditional archival descriptive practices to

fully comprehend the complexities and inhibitions of interacting with archives in a digital environment. Most often, physical archival collections are cataloged and described through collective control or "collective description," defined as, "A technique of cataloging related items as a unified whole in a single record" ([Pearce-Moses 2005](#)). This aggregate approach to description, which typically takes the form of a finding aid, in part echoes the value of archival items as a collective and interconnected whole. It also reflects the practical reality of the amount of description that is feasible within the scope of most physical archival collection processing due to the large volume of materials contained therein. Collections are typically described as record groups, manuscript collections, or series, and they are unified through a common record creator--an individual person, a family, or some type of organization ([Theimer 2012](#)). In the digital environment, however, digitized archival collections may be enhanced through digital curation with the creation of significant item-level metadata, providing intellectual control at a more granular level and often enabling item-level access through searchable databases. This direct facilitation of item-level access beyond the confines of the traditional collective description and container lists found in standard finding aids offers convenience, but librarians, instructors, and students will benefit from keeping the long-standing context-based archival principles of original order, provenance, and collective description in mind to fully understand the significance of archival collections as collective sources of documentation.

Opportunities for Instruction & Curricular Integration

In fields largely focused on innovation, discovery, and progress, it can be difficult to conceptualize the relevance of archival primary sources--even clearly defined science and technology focused collections--to today's STEM constituents. However, many productive opportunities exist for library and archival practitioners to integrate archival collections and primary source instruction into STEM education initiatives. These materials can teach students about the process of scientific inquiry or invention; lend insights into the foundational work of influential researchers and practitioners; expand students' understanding of the process of information creation, scholarly conversations, and authority; or more simply, provide students with the opportunity to connect directly with a piece of documentary science or technology history, which helps to make that history more authentic and personal. Active engagement, critical thinking, and analysis are essential components of archival research as well as valuable skills for STEM students. Furthermore, engaging STEM students with archives can provide a bridge for conversations and education surrounding contemporary digital records and data management as well as serve as an entryway to engagement directly with physical archives.

There is a robust record of literature published that focuses on general archival instruction from which librarians, archivists, and departmental faculty or teachers may draw in designing relevant coursework. The discussion here focuses on literature related to post-secondary education, but the use of archival materials in teaching is extensively explored and documented at a range of education levels. One particularly noteworthy work is the *Teaching with Primary Sources* volume in the Society of American Archivists' Trends in Archives Practice modular series, a practical text that discusses aspects of archival literacy, teaching, and case studies ([Hinchliffe and Prom 2016](#)). This guide serves as a thorough starting point by which to explore teaching opportunities and their broader context within the framework of information, archival, and primary source literacies. The bibliographies at the end of each chapter also provide ample suggestions for further reading.

Though the publication record on archival instruction in STEM fields in particular is relatively slim, a number of practical articles have been published in this area thus far. These articles may help to inspire creative ways by which librarians, archivists, and educators can explore incorporating archival primary source materials into STEM classrooms.

One example of archival instruction integration in post-secondary STEM education includes a New York University (NYU) archivist who worked with the university's computer science department to integrate archival research into a "Computing in the Humanities" course ([Bunde and Engle 2010](#)). The collaboration culminated in a final course assignment incorporating curatorial selection, digitization, and interpretation of

archival materials in context. Another study by University of Colorado Boulder librarians describes their work with the Herbst Program of Humanities for Engineers, through which they routinely collaborate with STEM faculty to develop coursework integrating primary source or special collection materials into a dynamic active learning context ([Brown et al. 2014](#)).

A 2015 case study by New York University's (NYU) Christopher Leslie and Lindsay Anderberg lays out a thorough literature review summarizing the published landscape of archival instruction with a focus on STEM from 1975 to the present ([Leslie and Anderberg 2015](#)). Leslie and Anderberg's study itself focuses on a collaborative archival research experience with the NYU Tandon School of Engineering (previously NYU Polytechnic School of Engineering), which incorporated two archival instruction activities into a History of Western Philosophy course that looked into aspects of how history can inspire innovation. The first activity began with an analysis of the distinctions between tangible primary and secondary sources. This was followed by an inquiry-based learning exercise, where students were tasked with theorizing how materials in an unmarked archival collection were related, what their overarching subject was, and why they were significant, among other questions. The second activity involved examining a pre-selected archival collection with the help of descriptive information and writing a brief research paper based on a set of supplied prompts.

A subsequent paper presented by Leslie and Anderberg at the American Society for Engineering Education Conference in 2016 further details the above-mentioned archival instruction project as it relates specifically to essential skills for engineering students ([Leslie and Anderberg 2016](#)). The authors specifically frame their discussion through the lens of the ABET engineering education accreditation standards, focusing on ABET 3: student outcomes. In line with ABET, Leslie and Anderberg's students participate in hands-on archival research following an active learning model, bring in concepts of social context and ethics, and build analytical, teamwork, and communication skills. The authors also discuss how the archival research experience teaches students the concept of archives as nontraditional sources of raw data for engineers, which can be analyzed and interpreted. Additional lessons include learning to deal with uncertainties in research and innovation as well as the basic recognition by students of archives as useful resources that can provide valuable sources to inform engineering work and research.

In a prior case study, Anderberg described her work with another NYU Polytechnic School of Engineering seminar course on technology transfer, in which the Keller Mechanical Engineering Corporation archival collection was integrated into a semester-long research project for upper-level undergraduates ([Anderberg 2015](#)). This time-intensive instruction initiative incorporated many aspects of archival literacy, including finding aid navigation, how to locate and handle materials, ways in which to interpret "archival silences" when available documentation does not overtly answer a research question, and how to interpret available information to understand the underlying processes and activities of knowledge production.

Another study published in 2016 by University of Oklahoma librarians Jeffrey Widener and Jacquelyn Slater Reese addresses the authors' experience incorporating archival collections into a four-week introductory geographic information systems (GIS) summer course for undergraduate and graduate students ([Widener and Reese 2016](#)). The authors collaboratively designed a final project for their GIS course using campus directories from the library's special collections as historical spatial data sources. Throughout their work, Widener and Reese emphasize the importance of collaboration between archivists, librarians, and departmental faculty to more effectively and creatively integrate information and data literacy skills into interdisciplinary course curricula. This unique approach empowered students to independently explore and discover the complex connections, relationships, and informational value embedded in archival information sources, as well as understand how technology may be used to visualize and analyze data contained therein.

Civil engineer Andrew T. Rose, of the University of Pittsburgh at Johnstown, also discussed his experiences using archives as sources for classroom learning through a project using the archival collection of a former governor to better understand the historical context of politics and public policy that shaped the building of a hydroelectric power dam ([Rose 2015](#); [2016](#)). Rose emphasizes that archives help to give students and

researchers a complete picture of the complex processes underlying historical events. Though he did not develop his project in coordination with librarians or archivists, Rose highlights the importance of librarians and archivists to provide user-friendly web interfaces and publicize archival resources to engineering departments in a targeted way, which may result in increased faculty integration of archival materials into coursework.

Teaching specifically with digitized archival materials in any discipline is a growing but relatively nascent field of scholarship in the professional literature. Digital surrogates have clear commonalities with physical originals, but their removal from a traditional archival context, where provenance, original order, and collective description are guiding principles, presents differences that should be taken into consideration when designing instruction. In his chapter in the edited volume *A Different Kind of Web*, Jeffrey McClurken gives an overview of the context for incorporating digital archives into undergraduate education ([McClurken 2011](#)). The most prominent opportunity highlighted is the exponential growth in accessibility of archival materials, previously limited by geography and singular holdings. Limitations discussed include the need for collection and item-level stable URLs, the learning curve with nonstandard user interface design of digital collection portals (the point of entry to access one or multiple collection online), and perhaps most significantly, the potential disconnect between physical access, reliant on traditional archival arrangement and description, versus searchable item-level access to digitized documents, which are easily removed from the context of their collections.

Robert Montoya published a 2016 article examining the influence of institutional, bureaucratic, economic, and power dynamics on digital library infrastructure, primarily in terms of the social practices of selection for digitization candidates ([Montoya 2016](#)). This article helps to lay an important theoretical foundation of understanding in terms of why certain archival collections, portions of collections, or individual items are digitized rather than others, and how this may influence research and instruction in ways that differ from access to a complete physical repository's collections.

Moreover, a 2015 essay by Jessica Enoch and Pamela VanHaitsma explores the integration of digital archival research into undergraduate coursework from a pedagogical angle ([Enoch and VanHaitsma 2015](#)). The authors argue that this type of research requires comprehension of aspects of archival literacy, particularly critical analysis of the rhetorical properties of digital archives. Their focus on digital archives through the lenses of selection, exigence, narrative, collaboration, and constitution introduces a complex theoretical framework through which librarians and archivists may explore opportunities to incorporate not just archival digital objects into instruction, but also information about the complex contexts within which these collections are created and accessed online.

Archives as Sources in STEM Research

The usage of archival materials as sources within science and technology research is relatively sporadic but appears integrated across many subject areas. A thorough analysis of archival source usage in STEM research is beyond the scope of this webliography, but several examples are provided to aid in sparking potential inspiration.

One particularly rich disciplinary example exists at the intersection between the fields of historical ecology and conservation biology, within which researchers may use archival materials as information sources about historical ecosystems or species populations to inform contemporary conservation initiatives. Records of relevance may include narrative accounts such as diaries, field notes, correspondence, and oral histories; data sources such as ledgers, log books, or digital data sets; photographs; audiovisual recordings; and other resources. A relatively robust body of representative research has been produced in marine historical ecology and conservation. In a 2012 article by Loren McClenachan et al., the authors present an argument for the significance of archival data and accounts in informing population baselines for the conservation of marine

species and ecosystems ([McClenachan et al. 2012](#)). A 2015 follow-up article by McClenachan et al. builds upon this concept, giving an overview of aspects of value in, extant usage of, and opportunities for archival sources in historical ecology and conservation research, laying the groundwork for best practices for the disciplinary usage of archival sources ([McClenachan et al. 2015](#)).

Archival sources have also been used relatively frequently in the realm of earth science research to provide unique evidence for historic geography and weather events used in the context of climate change research. In 1998, authors A.J. Fox and A.P.R. Cooper published an article about their use of archival aerial photography documenting snow and ice cover in the Antarctic Peninsula as a tool by which to measure climatic change ([Fox and Cooper 1998](#)). In a 2011 article by Claire Smith and Nigel Lawson, the authors used archival records, data, and news sources to provide historical information for a database documenting significant weather events in Manchester, UK ([Smith and Lawson 2011](#)). In tangent with statistical analysis of climate data, the information from archival sources was used to develop "quantifiable climate risk indices" to project future severe weather incidents and inform preparedness efforts.

In addition to the use of archival collections documented through published STEM research, anecdotal evidence suggests that scientists consult archives in the course of unpublished practical work as well. This type of usage is not easily captured and communicated on a broad scale, but a 2015 post on archivist Kate Theimer's popular professional blog ArchivesNext includes many crowdsourced contributions from archivists sharing how historical primary source collections have been used to inform a broad range of scientific work and research, much of it unpublished ([Theimer 2015](#)). Representative examples shared include researchers' use of materials from the Oregon Hops and Brewing Archive to inform current agricultural practices and a biology professor's course project through which students analyzed historical diets using archival cookbooks to understand the interrelationship between nutrition, health, and disease.

Scope and Methods

This webliography is intended as a guide to an array of digitized archival collections documenting progressive work in STEM disciplines over time. It is selective in scope, with the intent to highlight a strong set of collections that preserve the work and lives of prominent STEM and allied researchers from diverse fields, including the natural and physical sciences, technology, computer science, engineering, and medicine. A majority of the selected resources are collections related to specific individuals, and a smaller portion are thematic. During the selection process, resources were weighed in terms of collection extent, range of material formats and topics, and significance of the scientific or technological contributions of the collection's subject. Digital collections consisting entirely of published works, such as rare books or periodicals, were primarily excluded from the webliography, with the intent to focus on content that is more unique and less easily discoverable. It can be assumed that over time, additional STEM-focused archives collections will be digitized and made available, but due to the unique nature of archival primary source resources, the enduring value of the digital collections indexed here will not diminish.

With a goal for maximum usability by US educators and students, the scope of the selections is focused on content digitized through American and British repositories, and the primary language of most collections is English. Through the wide-ranging search and selection process, an effort was made to identify archival collections from a diverse range of individuals and subjects, but the resulting collection of resources identified for inclusion in the webliography nevertheless trends white and male. It must be noted that this is not representative of the full range of impact and achievement in science and technology. A potential explanation is that most of the collections in the webliography document STEM researchers active in the 19th and early-to-mid-20th century, when women and racial and ethnic minority individuals were less well represented in US and UK STEM work as well as less likely to be popularly recognized for their contributions and achievements. The imbalance may also suggest that popular recognition of achievement and influence through selection for archival preservation and digitization has historically been prioritized towards white male

scientists in the Western world for a variety of reasons, creating a bias in archival collective memory. To fully understand the archival record in this sense, the information profession will benefit from future efforts both to compile a more comprehensive webliography focused on existing digitized archival collections from STEM researchers in traditionally marginalized groups as well as to increase digitization efforts focused on the collections of a more diverse representative group of STEM researchers.

Resources included in the webliography were identified through a multifaceted search process employing aggregate archival collection databases, collected biographies, targeted Google searches, and online repository browsing. Searches included combinations of broad STEM subject terms, personal names, repository names, and terms related to digital archival collections.

Aggregate databases employed include ArchiveGrid and Archive Finder. ArchiveGrid is an open access database under the domain of OCLC ([ArchiveGrid 2016](#)). It indexes specific archival collections cataloged primarily through MARC records from OCLC's WorldCat. Archive Finder is a subscription database powered by ProQuest integrating archival collection information from the ArchivesUSA and National Inventory of Documentary Sources in the UK and Ireland (NIDS UK/Ireland) indices ([Archive Finder 2016](#)). These aggregate sites were primarily searched by subject and individual personal name. Within both ArchiveGrid and Archive Finder, most resources indexed do not include digitized components, rather they refer to physical collections. However, these databases can be used as gateways to explore potential digital holdings on a specific individual or narrow topic.

Subject search terms used include core STEM topics--science, technology, engineering, and mathematics--as well as more focused terms, including biology, chemistry, computer science, natural history, medicine, and physics. Individual names were primarily searched in Google combined with the phrase digital archives. These names were sourced predominantly from the reference works *The Scientific 100: A Ranking of the Most Influential Scientists, Past and Present* ([Simmons 1996](#)) and *Headstrong: 52 Women Who Changed Science - And the World* ([Swaby 2015](#)), in addition to names gathered through Google searches for influential women and minority researchers in STEM. Specific repositories searched include digital archival collections at known major governmental or independent institutions as well as all R1 Doctoral Universities in the Highest Research Activity class according to the Carnegie Classification system ([Indiana University Center for Postsecondary Research 2015](#)). Repositories were located using a combination of repository name and broad terms including: library archives digital collections. Digital repositories were searched on a subject basis, the specifics of which varied by individual interface.

The web resources are organized into eight subject-based sections arranged in alphabetical order, including a section related to generalized STEM collections. Within each subject area, resources are further arranged in alphabetical order by personal name or title. Collections attributed to specific individuals are alphabetized according to surname, followed by exact transcription of the collection title.

It should be noted that due to the lack of permanent URLs in most digital archives interfaces, it is conceivable that links to specific collections may become invalid over time. Because digitized collections are valued resources, it is unlikely that these digital materials will disappear entirely; rather, they should remain accessible through search or browse capabilities on affiliated institutional library, archives, or digital collection web interfaces.

Resource List

Biology & Natural History

Agassiz, Louis - Louis Agassiz Correspondence and Other Papers (Houghton Library, Harvard University)

<http://oasis.lib.harvard.edu/oasis/deliver/~hou00416>

Harvard University's Houghton Library is home to a robust collection of papers from influential 19th century zoologist and geologist Louis Agassiz (1807-1873), who was a longtime professor at Harvard University and founder of its Museum of Comparative Zoology. All 718 items in the collection are digitized and openly available through a basic hyperlinked finding aid, though discovery may be limited by sparse descriptive metadata. The large majority of materials are correspondence, in addition to papers related to a legal dispute. Languages represented include French, English, and German. The digitized documents provide an intimate perspective into Agassiz' work, interests, and relationships throughout his lifetime.

Biodiversity Heritage Library

<http://www.biodiversitylibrary.org/>

The Biodiversity Heritage Library is a consortial digital project managed through the work of more than 30 member and affiliate libraries with relevance to biodiversity, natural history, or botany. The consortium aims to digitize and make available publications, manuscripts, field notes, and related items that document biodiversity over time, with more than 200,000 volumes digitized to date. The majority of presently digitized content consists of published works, but the growing collections also include archival correspondence, journals and field diaries, notes, and maps. Content may be browsed or searched, with particularly helpful indexing by subject and scientific name.

Codebreakers: Makers of Modern Genetics (Wellcome Library)

<http://wellcomelibrary.org/collections/digital-collections/makers-of-modern-genetics/digitised-archives/>

The Wellcome Library (London, UK) provides access to numerous digital collections related to diverse aspects of life science and medical history from 1863-2008. Codebreakers: Makers of Modern Genetics is a joint digital initiative between Wellcome Library and a number of partner institutions in possession of relevant physical collections. This portal brings together 22 digitized archival collections from many of the prominent scientists and research bodies who worked to establish and develop the field of genetics. Several of these notable scientists include Sydney Brenner, Francis Crick, Francis Galton, Peter Medawar, Frederick Sanger, and James Watson. Digitized materials include research notebooks, correspondence, lecture and teaching materials, manuscripts, news clippings, and more. Organization varies by collection, but the interface offers effective searching and straightforward browsing capabilities within each individual collection.

Darwin, Charles - Charles Darwin's Library (Biodiversity Heritage Library, Cambridge University Library, & American Museum of Natural History)

<http://biodiversitylibrary.org/collection/darwinlibrary>

This ongoing digitization project aims to create a virtual reconstruction of Charles Darwin's (1809-1882) personal library, combining known surviving books from his original collection and surrogates of additional identified works. Materials, currently over 540 volumes, are accessible via the Biodiversity Heritage Library (see description above). Many of the books from Darwin's personal collection include extensive marginalia notes, which are in the process of being transcribed post-digitization. These notes lend personal insights into Darwin's scientific perspective and thought patterns. Content may be navigated through a full book list, browsable subject index, or via multifaceted search.

Darwin, Charles - Darwin Correspondence Project (Cambridge University Library)

<https://www.darwinproject.ac.uk/>

The Darwin Correspondence Project hosted by Cambridge University Library includes more than 8,500 digitized letters sent to and received by Charles Darwin (1809-1882) up through 1871, plus select metadata related to an additional 6,500 letters. Digitized collection contents are transcribed and searchable but may also be browsed by select correspondents as well as a handful of subject themes.

Commentary on topics including evolution, geology, life sciences, human nature, and religion helps to put the letters in context with Darwin's broader work and perspective. The interface also includes curated learning resources for different educational levels in addition to audio, video, and other historical sources that may enhance learning and exploration of the digitized Darwin materials.

Darwin, Charles - Darwin Manuscripts Project (American Museum of Natural History & Cambridge University Library)

<http://www.amnh.org/our-research/darwin-manuscripts-project>

The Darwin Manuscripts Project is a collaborative digital repository hosted by the American Museum of Natural History, which includes the official Charles Darwin Papers deposited in the Cambridge University Libraries. The project currently makes available more than 23,000 high resolution digital images of original manuscripts by Darwin (1809-1882), many of which are transcribed. The full database catalogs more than 96,000 manuscript pages, with goals for further digitization. Many of Darwin's working scientific papers are now available digitally, including theoretical notes, journal entries, drawings, and draft writings leading up to and following the publication of *On the Origin of Species*. Navigation may be a challenge, as browsing and search functions are relatively limited and unintuitive. One effective way to browse is through the "Catalogues" option, from which users may then browse by repository (under "Union Catalogue") or subject (under "Subject Catalogues"). When conducting a search, results will include links to specific pages within multipage resources. Prior to searching or browsing any resources, all users are required to click through a use agreement.

Expeditions and Discoveries (Open Collections Program, Harvard University Library)

<http://ocp.hul.harvard.edu/expeditions/>

The Harvard University Library hosts a curated online portal for digitized archival materials related to scientific and exploratory expeditions conducted from 1626-1953. Harvard was heavily involved in conducting and supporting expeditions in the 19th and 20th centuries, and many of the collection items are related to these affiliated trips. In addition to original handwritten expedition notes and natural history observations, the portal also provides access to many digitized published accounts. Topical areas include biology, botany, marine environments, archaeology, cultural anthropology, and astronomy. Material formats include field notes, diaries, correspondence, and manuscripts. Content may be browsed by expedition name, item format, personal name, geographic region, or subject. Content may also be navigated through full-text or multifaceted catalog search.

The Field Book Project (Smithsonian National Museum of Natural History Library)

<http://www.naturalhistory.si.edu/rc/fieldbooks/>

Beginning in 2010, the Smithsonian National Museum of Natural History (SNMNH), together with the Smithsonian Institution Archives, embarked on a large-scale digitization effort to expand access to scientific field books within their collections. The Smithsonian also joined with the Biodiversity Heritage Library in 2014 to further expand ongoing digitization, cataloging, and access initiatives. These digitized documentary materials on the SNMNH portal span geographic locations around the world and date from the 18th century up through the 21st century, with topics ranging from general biodiversity to specific scientific classifications in areas of biology, geology, and paleontology. In addition to field observations, the collection also includes affiliated reports, correspondence, photographs, maps, illustrations, and other content. Search and browsing options are relatively expansive, with field book records indexed through the Smithsonian Collections Search Center, Biodiversity Heritage Library, as well as the Digital Public Library of America.

Linnaeus, Carl - Carl Linnaeus Collections (Linnean Society of London)

<http://linnean-online.org/linnaeus.html>

The Linnean Society of London holds more than 4,000 letters, 300 manuscripts, and 1,600 books, some of which are annotated, from the personal collection of Swedish natural scientist Carl Linnaeus

(1707-1778), who is credited with establishing the binomial nomenclature system of species classification. A significant portion of these materials are digitized, some of which are also transcribed, providing a unique look into the research, development, and relationships of Linnaeus over the course of his life and career. In addition, the Linnean Society provides digital access to images of Linnaeus' specimen collections, including fish, insects, plants, and shells. Digital content may be browsed primarily by specimen type, document format, title, and correspondent, and a simple search function is also available.

Livingstone, David - Livingstone Online (University of Maryland Libraries)

<http://livingstoneonline.org>

This collaborative digital museum and library, hosted through the University of Maryland Libraries, is the portal to an extensive compilation of digitized manuscripts and transcriptions from over 40 repositories that together document the work and travels of Victorian explorer David Livingstone (1813-1873). In addition to his work as an explorer and medical missionary in Africa, Livingstone was a prolific writer who recorded observations on the geography, biology, climate, and cultures he encountered through his travels. Digitized items include correspondence, field diaries, journals, notebooks, hand-drawn maps, and related artifacts, some of which are transcribed. An innovative spectral imaging and processing technology is applied to a portion of key documents, which reveals text faded to illegibility by the naked eye. Browse options include by addressee, repository, timeline, or full digital catalog with limiting functions. An effective basic search is also available.

Wallace, Alfred Russel - Alfred Russel Wallace Notebooks Collections (Linnean Society of London)

http://linnean-online.org/wallace_notes.html

The Linnean Society makes available ten fully digitized notebooks documenting the field work and observations of naturalist, biologist, and explorer Alfred Russel Wallace (1823-1913), who published his independently developed evolutionary theory prior to the publication of Darwin's famed *On the Origin of Species*. The notebooks are easily browsed due to the small quantity; they contain extensive writings, species lists, and specimen sketches documenting geographically dispersed studies.

Watson, James D. - James D. Watson Collection (Archives Repository, Cold Spring Harbor Laboratory)

<http://libgallery.cshl.edu/collections/show/3>

The Cold Spring Harbor Laboratory (Cold Spring Harbor, NY) holds a collection of over 38,000 digital items documenting the life and career of James D. Watson (b. 1928), the first director of the National Center for Human Genome Research and winner of the Nobel Prize in Physiology or Medicine for his joint work in the discovery of DNA's double helix structure. The collection includes digitized correspondence, laboratory notes, manuscripts, administrative documents, teaching materials, memorabilia, photographs, and other records. Materials can be searched or browsed through a single list or by subject, personal, or organization-based tags, but navigation can be unwieldy due to the high volume of items and associated tags.

Chemistry

Oesper Collections in the History of Chemistry (Digital Collections, University of Cincinnati Libraries)

<http://digital.libraries.uc.edu/oesper/>

The online Oesper Collections in the History of Chemistry is a joint initiative of the University of Cincinnati's Ralph E. Oesper Chemistry-Biology Library and Department of Chemistry. Key historical content includes the Apparatus Museum section, featuring high resolution three-dimensional images of approximately 400 historical scientific chemistry artifacts ranging from the period of 1650-1970; the Java browser plug-in is required to view these images. Descriptive metadata accompanies each

apparatus, including details related to the inventor, time period of invention, manufacturer, and basic description. Apparatus images are accessible through the "Displays" link, where content can be browsed by number, name, or case; the site does not support a search function. The Oesper Collections also make available numerous digitized portraits and sizable bibliographies representing the work of five notable 18th and early 19th century chemists.

Pauling, Linus - Linus Pauling Online (Special Collections & Archives, Oregon State University)

<http://scarc.library.oregonstate.edu/digitalresources/pauling/>

Oregon State University (OSU) is home to an archival collection of Linus Pauling (1901-1994), acclaimed chemist and winner of the Nobel Prize in Chemistry as well as the Nobel Peace Prize. Though the full collection is not yet digitized, 46 of Pauling's research notebooks dated 1922-1994 are digitally available through the "Pauling Research Notebooks" link, documenting the details of Pauling's work, including laboratory calculations, experimental data, scientific conclusions, ideas for additional research, and related ephemera. The notebooks may be browsed by number/date, through a subject index, or via selected highlights. OSU also provides access to additional Pauling biographical resources, a learning curriculum, and digital documentary history exhibits, which feature additional curated digitized archival content.

Pasteur, Louis - Louis Pasteur (1822-1895) (Institut Pasteur)

http://phototheque.pasteur.fr/en/navigation/list/WS/HOME_MENU/node/48/slug/louis-pasteur-1822-1895/nobc/1

The private non-profit foundation, Institut Pasteur (Paris), provides access to a portion of digitized documents, photographs, scientific apparatuses, and art pieces, which chronicle key aspects of French chemist and microbiologist Louis Pasteur's (1822-1895) work. Scientific subject areas include crystallography and molecular asymmetry, microbial fermentation, spontaneous generation, silkworm diseases, rabies, and vaccinations, in addition to personal content related to Pasteur's family and artistic work. The default interface and description is in French, with an English translation option, though the translation feature does not apply to all metadata. The interface is highly visual with the option to browse subject- and format-based collections in addition to strong search capabilities. Within any collection or search results page, users have the option to refine through period, directional orientation, and a set of subject or keywords.

Computer Science

Atanasoff, John Vincent - John Vincent Atanasoff (Digital Collections, Iowa State University Library)

<http://digitalcollections.lib.iastate.edu/john-vincent-atanasoff>

The Iowa State University (ISU) Special Collections Department holds a substantial 60 box archival collection from John Vincent Atanasoff (1903-1995), a former ISU faculty member credited as the inventor of the first electronic digital computer. A selection of 29 pivotal documents from the collection are currently digitized, which illustrate the development of the Atanasoff-Berry Computer (ABC), created by Atanasoff with the help of Clifford Berry. Digitized items, available through the "digital collection" link, include original photographs, drawings, and manuscripts related to ABC's design and functionality, along with several legal documents and video clips. Content may be searched or browsed using subject term, date, personal name, and format.

Computer History Museum Collections (Computer History Museum)

<http://www.computerhistory.org/collections/>

The web site for the Computer History Museum (Mountain View, CA) hosts a growing collection of searchable digitized materials from a sizable physical archive documenting the history of computing technology. Currently available materials include oral history transcripts and video files, patent

notebooks from the Fairchild Semiconductor Corporation, and computer marketing brochures. Of particular note is the Gwen Bell Artifact and Book Collection, which contains over 200 digitized books on calculating devices and computing technology spanning from the early 1600s to approximately 1980, along with more than 250 images of corresponding technological devices. Content may be browsed by collection or navigated through a full catalog or collection specific search.

Feigenbaum, Edward A. - Edward A. Feigenbaum Papers (Stanford University Libraries)

<https://exhibits.stanford.edu/feigenbaum>

Stanford University holds the papers of Edward A. Feigenbaum (b. 1936), a prominent computer scientist who conducted early work in the development of large-scale artificial intelligence systems. The finding aid for the full physical archival collection is indexed in the Online Archive of California (linked from the "About" tab under "About the Collection"), and over 450 select digitized items are linked from the finding aid as well as curated through the digital hosting platform. These digitized materials include research project files, administrative records related to the Stanford Computer Science Department, correspondence, proposals, reports, lab memos, and audio and video media. Content is navigable through search and limiters such as author, organization, year, document type (format), and series, as well as through selected topical highlights on the collection landing page.

History of Artificial Intelligence (Stanford University Libraries)

<https://exhibits.stanford.edu/ai>

Stanford University's digital History of Artificial Intelligence interface brings together related materials from several collections (1950-2009) in the Stanford University Department of Special Collections & University Archives, with significant representation from a portion of the papers of Edward Feigenbaum, a pioneer in expert systems and artificial intelligence (AI). Together, these digitized materials document the history and development of AI technology at Stanford, within Silicon Valley, and in the broader AI community. Items include audio and video recordings, books, manuscripts, and images highlighting lectures, labs, projects, and AI in action. Content is navigable through search and limiters including resource type (format), date, author, topic, organization, genre, and collection.

Kleinrock Center for Internet Studies (University of California, Los Angeles Library)

<http://digital2.library.ucla.edu/internethistory/>

University of California, Los Angeles' (UCLA) Kleinrock Center for Internet Studies holds a substantial physical archives collection documenting the history of the internet. A portion of these materials is available digitally, hosted by the UCLA Digital Libraries. The scope of the digital collections is focused on early internet history at UCLA (c. 1950s-1970s), including materials related to the Network Measurement Center, which was the first Advanced Research Projects Agency Network (ARPANET) node at UCLA, as well as the related papers of individuals including Lawrence G. Roberts, Martin Thrope, George Eisler, and Michael Wingfield. Material formats represented are project notes, drawings, correspondence, data, reports, photographs, oral history audio, and more. Content may be browsed by collection with language, name, subject, and type limiters in addition to the option to search within each collection. Item level metadata is relatively sparse, which may make discovery more difficult.

Lovelace, Ada - Ada Lovelace Mathematical Papers (Clay Mathematics Institute)

<http://www.claymath.org/publications/ada-lovelaces-mathematical-papers>

Augusta Ada King (née Byron), Countess of Lovelace (1815-1852), the daughter of poet Lord Byron, gained recognition as a mathematician and early pioneer in computer science. She is considered a visionary who theorized the potential operation and capabilities of an early iteration of a computer. A portion of archival materials from the Lovelace Byron family papers, part of the Bodleian Library collection on deposit at the Clay Mathematics Institute (Peterborough, NH), is termed "Lovelace-De Morgan Correspondence". This material includes approximately one year of mathematical

correspondence between Lovelace and mathematician Augustus De Morgan, in addition to other mathematical computations and sketches. Digital materials are navigable through a basic annotated index, and each item may be accessed both as a digital image as well as through full textual transcript.

Newell, Allen - Allen Newell Collection (Carnegie Mellon University)

<http://diva.library.cmu.edu/Newell/>

This digitized archival collection includes more than 150,000 searchable and downloadable digital images documenting the research and teaching of Allen Newell (1927-1992), a Carnegie Mellon University computer scientist and pioneering researcher in the field of artificial intelligence. Digital collection contents include correspondence, data from cognitive experiments, scientific papers, reports, manuals, project proposals, departmental files, and teaching and presentation materials, among other items. Together, these materials document the development and broad scope of Newell's work. From the collection information page, which contains contextual information and a link to the original finding aid, digital items may be accessed through the "Access" link followed by the "Search the Collection" link; users will be redirected to a new digital resource hosting platform. From there, items may be searched or browsed via hierarchical series and folder links.

Turing, Alan - Turing Digital Archive (Archive Centre, King's College, Cambridge University)

<http://www.turingarchive.org/>

Nearly 3,000 images of materials from the Alan Turing (1912-1954) collection held by the King's College Library are available online through the Turing Digital Archive. These items, including correspondence, lecture notes, typescripts of talks, drafts and unpublished manuscripts, and commemorative materials, document Turing's work as a renowned pioneer in the fields of computer science and artificial intelligence. Materials are searchable and browsable by subject or item-level index.

Engineering & Technology

Armstrong, Neil - Neil Armstrong Digital Exhibit (University of Cincinnati Libraries)

Digital Exhibit: <http://uc.edu/armstrong>

Neil Armstrong Commemorative Archives: <http://drc.libraries.uc.edu/handle/2374.UC/713357>

This commemorative digital exhibit features a curated timeline, biographical information, and 360 high resolution views of noteworthy 3D objects related to Neil Armstrong (1930-2012), pioneering astronaut and University of Cincinnati Professor of Aerospace Engineering. The exhibit also includes links to the full Neil Armstrong Commemorative Archives collection portal, providing full access to the collection of digitized archival letters, photographs, press releases, articles, artifacts, and other documents chronicling Armstrong's time as a professor at UC and elements of his broader career. Content may be searched (basic or advanced) as well as browsed using author, title, subject, date, and series links. Key digital objects may also be browsed visually through the accompanying digital exhibit link.

Baldwin, Loammi - Loammi Baldwin Papers (University of Chicago Library)

<https://www.lib.uchicago.edu/e/scrc/findingaids/view.php?eadid=ICU.SPCL.CRMS203>

The University of Chicago digitized a collection of 247 pieces of handwritten correspondence to and from Loammi Baldwin (1780-1838), a pioneer in civil engineering who worked primarily in the Eastern United States during the early 19th century. Though Baldwin archival collections exist at other institutions, this correspondence is the only widely accessible digitized material currently available from any repository. These items provide a unique view into Baldwin's personal life, perspective, and many significant projects. Individual letters are not indexed or transcribed, but high resolution scans allow for close examination. Digital content is accessible by date at the folder level through a hyperlinked finding aid.

Bell, Alexander Graham - Alexander Graham Bell Family Papers (Library of Congress)

<https://www.loc.gov/collections/alexander-graham-bell-papers/>

Select content from the Alexander Graham Bell Family Papers collection at the Library of Congress has been digitized and made available online, including over 4,500 items from a total 145,000 collection items. Most of the digitized items specifically relate to inventor Alexander Graham Bell (1847-1922). These digital materials include correspondence, scientific notebooks, drawings, and writings such as articles, notes, and poetry. Together, they document Bell's personal life, relationships, and robust career as a scientist, engineer, and most famously, as the inventor of the telephone. The digital platform supports searching within the collection as well as robust limiters to enhance browsing, including format, date, location, series, contributor, and subject.

Brush, Charles F., Sr. - Charles F. Brush, Sr., Papers (Kelvin Smith Library Special Collections, Case Western Reserve University)

<http://ead.ohiolink.edu/xtf-ead/view?docId=ead/OCIW0001.xml;query=brush;brand=default>

Charles F. Brush, Sr. (1849-1929) was a significant scientist, electrical engineer, and successful entrepreneur in the late 19th and early 20th centuries and is credited as the inventor of the arc lamp. Brush's papers, amounting to 25 linear feet, are archived at Case Western Reserve University, and nearly the entire collection is digitized and available through a detailed browsable finding aid with folder-level hyperlinks to digital content. Materials include correspondence, business files, legal records, patents, laboratory notes, articles, and other writings. Together, the materials lend insight into Brush's work, relationships, engineering innovations, and business practices.

Edison, Thomas A. - Thomas A. Edison Papers (School of Arts and Sciences, Rutgers University)

<http://edison.rutgers.edu/>

The Thomas A. Edison Papers Project currently features nearly 175,000 digitized images from the personal and professional papers of Thomas Edison (1847-1931), famous American inventor. This digital archive represents more than 35 years of progressive work by Rutgers University and collaborating institutions to make the Edison papers widely accessible, with digitization efforts ongoing until the full collection is made available. The existing platform features materials that lend deep insight into Edison's life, inventions, innovations, and research processes. Due to the complexity of the interface with materials organized in a nonstandard format, navigating and searching the collection requires a learning curve, though instructions are provided. Search options include by single document (requires document ID), folder or volume description, or name. A straightforward access option for beginners is to browse via series notes.

IMechE Virtual Archive (Institution of Mechanical Engineers)

<http://archives.imeche.org/>

The Institution of Mechanical Engineers (IMechE), a London-based professional society, is home to thousands of archival artifacts documenting many important developments in the field of mechanical engineering, particularly in the United Kingdom. Hundreds of these items are now digitized and available through IMechE's Virtual Archive, with most content dating from the 19th and 20th centuries. Digitized content is easily searched or browsed through the archive's online interface, with items organized along key subject areas including the history of automotive technology, engines, railways, industry in general, and IMechE institutional history. Formats across subjects include artifacts, drawings and plans, notebooks, documents, photographs, and artistic renderings. Item highlights include engineering contributions to WWI, early automotive and railway designs, and miniature mechanical mock-ups.

Wright, Wilbur and Orville - Wilbur and Orville Wright Papers (Library of Congress)

<https://www.loc.gov/collections/wilbur-and-orville-wright-papers/>

The Wilbur and Orville Wright Papers collection at the Library of Congress contains more than 1,000 items and is fully digitized, providing a deep look into the familial relationships, personal lives, and innovative work of the Wright brothers. The digitized items document Wilbur (1867-1912) and Orville's (1871-1948) progress and achievements both leading up to and following their pioneering first flight in 1903. Materials primarily include digitized diaries, notebooks, correspondence, newspaper clipping scrapbooks, drawings, patents, and other legal documents. Researchers may search within the collection or browse with the help of format, date, location, series, and subject limiters.

Environment, Forestry, & Agriculture

Carson, Rachel - Rachel Carson Papers (Beinecke Rare Book & Manuscript Library, Yale University)

<http://beinecke.library.yale.edu/collections/highlights/rachel-carson-papers>

Yale University holds the archival papers of Rachel Carson (1907-1964), the biologist and environmentalist popularly recognized as the author of *Silent Spring* (1962), among other works. Carson's full paper collection is substantial, over 53 linear feet, but 34 items from the collection are now digitized and openly available online through the "view all images" link on the collection landing page, where they are easily browsed. Digital materials include photographs, correspondence, portions of draft manuscripts, and illustrations created for Carson's publications. Though the digital collection is modest at present, the selection of materials succinctly illustrates noteworthy components of Carson's famed contributions to environmental writing.

Carver, George Washington - George Washington Carver Digital Collection (University Library Digital Collections, Iowa State University)

<http://digitalcollections.lib.iastate.edu/george-washington-carver>

Iowa State University holds a collection of papers from George Washington Carver (c. 1864-1943), the scientist and educator popularly recognized for his agricultural research and food product development using peanuts and other plants native to the American South. Though Carver spent the bulk of his research career at Tuskegee University, which retains a substantial archival collection that is not yet digitized, he studied at Iowa Agricultural College (now Iowa State University), which is home to a collection of scientific correspondence between Carver and Iowa colleagues, most significantly with Carver's mentor, Dr. Louis Pammel. At present, 211 of these collection items, including primarily correspondence and photographs, are digitized and openly available. The digital materials are navigable through browse or search with personal name, subject, and date limiting options; a separate finding aid linked from the collection home page may be used to aid in discovery. Notably, digital item records include brief summaries in addition to a "text" tab that displays full transcriptions.

Douglas, Marjory Stoneman - Marjory Stoneman Douglas Papers (University of Miami Libraries)

<http://merrick.library.miami.edu/specialCollections/asm0060/>

Marjory Stoneman Douglas (1890-1998) was a journalist, writer, and vocal environmental and political activist who spent the bulk of her professional life in Florida. Douglas' most acclaimed work was the 1947 book *Everglades: River of Grass*, which promoted the environmental significance of the Everglades and essentially redefined public opinion of it as a vital ecological landscape. The University of Miami Libraries house a 79 box collection of Douglas' papers, and a selection of nearly 400 items are digitized and available online. Digital materials include correspondence, photographs, brief writings, and awards documenting aspects of Douglas' career and environmental advocacy initiatives. Items may be accessed in a variety of ways, including search with limiting options, full or subject based browse, or through a curated online exhibit. A full collection finding aid is also linked from the landing page, which helps to aid in discovery as well as put items into the context of the full collection.

History of Forestry (NC ECHO Project, North Carolina State University Libraries)

<http://www.lib.ncsu.edu/specialcollections/forestry/collections.html>

North Carolina State University (NCSU) hosts an online interface documenting the History of Forestry, an archival digitization project funded through a grant from the State Library of North Carolina, North Carolina Exploring Cultural Heritage Online (ECHO) program. The web site provides a united access point to 17 selectively digitized archival collections from NCSU, the Biltmore Estate, the Forest History Society, and the University of North Carolina at Asheville. Together, the materials document the history and development of forestry in North Carolina from the 1860s to 2000, including the lumber and natural resource industries, environmental research and management, as well as forestry education. Highlights include photographs, diaries, correspondence, reports and project files, printed materials, and artifacts from Carl A. Schenck, founder of the Biltmore Forestry School; the North Carolina Forestry Foundation; and the U.S. Forest Service, including the Forest Service's Southern Research Station. The collections are hosted on several different external institutional platforms, but all provide straightforward browsing capabilities through hyperlinked finding aids.

Leopold, Aldo - Aldo Leopold Archives (University of Wisconsin-Madison Libraries)

<https://uwdc.library.wisc.edu/collections/aldoleopold/>

Aldo Leopold (1887-1948) is considered a prominent early contributor to the development and practice of American environmental conservation and ecology in the first half of the 20th century. His papers are part of the archives at the University of Wisconsin-Madison, where he was a faculty member at the end of his career. Many items from his expansive 27.6 cubic foot archival collection are digitized and available, including correspondence, diaries, writings, reports, and research and project documents. The collection is searchable as well as easily navigable through a traditional hyperlinked finding aid.

Mapping the National Parks (Library of Congress)

<https://www.loc.gov/collections/national-parks-maps/about-this-collection/>

The Library of Congress created a curated online exhibit of nearly 200 digitized maps documenting four iconic US National Parks - Acadia, Grand Canyon, Great Smoky Mountains, and Yellowstone - with potential expansion to other parks as map digitization continues. In addition to addressing aspects of the parks' development, the map collection also includes materials that predate the parks, documenting the American understanding of these areas in terms of history, culture, and geology from the point of first European exploration onward. Maps date from the 16th through 20th centuries and are navigable by date, location, subject, contributor, language, and search. Accompanying articles and a teaching resource help to situate the materials in the context of their significance to the understanding of place.

Muir, John - John Muir Papers (Holt Atherton Special Collections, University of the Pacific)

<http://www.pacific.edu/Library/Find/Holt-Atherton-Special-Collections/John-Muir-Papers.html>

The University of the Pacific is home to approximately 75% of the extant papers of John Muir (1838-1914), naturalist, author, and environmental philosopher popularly considered a significant early influencer of the modern environmental movement. These materials are organized in a number of different collections, and many are now digitized and openly accessible through the unified John Muir Papers online portal. Digital archival content is organized and most easily navigable by format, including correspondence, journals, photographs, and drawing. Full transcriptions of textual digitized documents are included in item-level metadata. These materials elucidate many of Muir's relationships, ideas, philosophies, and artistic interpretations of the environment.

Natural Resources Digital Resources (Special Collections & Archives, Oregon State University)

<http://scarc.library.oregonstate.edu/digitalresources/naturalresources/index.html>

The Oregon State University Archives maintains a growing collection of digitized archival resources related to natural history, with a particular geographic focus on Oregon and the broader Pacific Northwest in the late 19th through the 20th century. This content is accessible through the Natural

Resources Digital Resources portal, which provides access to a number of curated collections. The majority of currently available digital resources are images, audiovisual recordings, and published works that document regional natural resources. Subject highlights include seed and nursery catalogs, stream surveys, wildfires, and materials related to the U.S. Forest Service, including collections from former Forest Service national historian Gerald W. Williams and the Siuslaw National Forest. Audiovisual resources, indexed together as a format-based collection, include documentary and promotional films, oral history recordings, and songs. Several collections are hosted on external sites, but generally content can be browsed through full collection item lists or through limiters such as creator, topic, region, local collection name, type, institution, and decade. Search functionality is provided across Oregon Digital collections but not within a single collection.

Medicine

Apgar, Virginia - Virginia Apgar Papers (Mount Holyoke College Archives and Special Collections)

http://asteria.fivecolleges.edu/findaids/mountholyoke/msh192_main.html

Virginia Apgar (1909-1974) was a leading obstetrical anesthesiologist who introduced obstetrical considerations to neonatology. She is also the developer and namesake of the Apgar Score, a test administered directly after birth to quickly assess key aspects of a newborn infant's health and physical condition. Apgar was a graduate of Mount Holyoke College (South Hadley, MA), and her papers were deposited with her alma mater. A portion of Apgar's papers are digitized and available through a link to the National Institute of Health's Profiles in Science platform. Materials may be searched or browsed by document type, including correspondence, articles, photographs, reports, and other writings. Digital item metadata is sparse, but the full collection finding aid linked from the Mount Holyoke interface may be used to supplement understanding.

Barton, Clara - Clara Barton Papers (Library of Congress)

<https://www.loc.gov/collections/clara-barton-papers/about-this-collection/>

The Library of Congress provides full digital access to a collection documenting the life and work of Clara Barton (1821-1912), a pioneering female teacher and nurse in the American Civil War who went on to found the American Red Cross in 1881. The collection, made up of 935 digital items, contains diaries and journals, correspondence, speeches, writings, subject files including content related to the Red Cross, and many other documents. Content within the collection may be searched or browsed through the "Collection Items" tab, with options to limit content by date, location, series, contributor, and subject provided. A link to the original collection finding aid is also available, with traditional full collection metadata and a content list, which may assist in effectively navigating the digital collection interface.

Franklin, Rosalind - The Papers of Rosalind Franklin (Wellcome Library)

http://search.wellcomelibrary.org/iii/encore/record/C__Rb1983228?lang=eng

Rosalind Franklin (1920-1958), a chemist and crystallographer, is most widely-known for her role in the discovery of DNA. She took and performed data analysis on x-ray diffraction photos of DNA, which Francis Crick and James Watson obtained without her knowledge and went on to build their Nobel Prize winning theoretical model. Franklin's archival papers, 24 boxes in total, are housed at the Churchill Archives Center (Cambridge), but a digital version is hosted by the Wellcome Library (London). Digital content may be searched or browsed hierarchically through an interactive finding aid. Over 100 digitized items are available, including publications, reports, conference materials, correspondence, notes, photographs, and ephemera. Content in the "Word on DNA" series includes Franklin's original calculations and analysis through which she discovered the structure of DNA, despite not being credited.

Medical Instruments and Artifacts (Harvey Cushing/John Hay Whitney Medical Library, Yale University)

<http://whitney.med.yale.edu/gsd/collect/medinst/>

A significant collection of historical medical instruments and related artifacts is part of the Yale University Cushing/Whitney Medical Library. This diverse collection of 1,391 items has been digitized using photographs and relatively thorough descriptive metadata, though as the collection stems from a series of donations over time, items lack thorough provenance information. Artifacts are accessible through browsing or a basic search. Most artifacts date from the 19th and 20th centuries, but a small portion extend back to the Roman period. Together, the digitized materials help to visualize Western medical and surgical practices over time.

Nightingale, Florence - Florence Nightingale Digitization Project (Howard Gotlieb Archival Research Center, Boston University)

<http://hgar-srv3.bu.edu/web/florence-nightingale/home>

In an effort to provide a single online access point to digitized archival resources related to Florence Nightingale (1820-1910), the woman considered the founder of modern nursing, four institutions -- Boston University, the Florence Nightingale Museum (London), the Royal College of Nursing (London), and the Wellcome Library (London) -- created the Florence Nightingale Digitization Project. This project is accessible via a collaborative web platform, hosted by Boston University, that provides access to over 2,200 items of digitized correspondence written by Nightingale, which together elucidate a broad range of details related to her work and relationships. Archival holdings from 18 repositories are currently represented through the project. Content is accessible through a simple search box or navigable by a small selection of suggested subject terms. In the search results view, users can further refine results through limiters including personal entities, corporate entities, subjects, language, and collection. To browse all digital items, users may conduct a blank search. Item-level metadata is relatively robust, with every piece of correspondence described by a brief summary.

Population and Reproductive Health Oral History Project (Sophia Smith Collection, Smith College)

<https://www.smith.edu/libraries/special-collections/research-collections/resources-lists/oral-histories/population-reproductive-health/narrators>

Smith College (Northampton, MA) is home to the Population and Reproductive Health Oral History Project, which includes an online repository of digital oral history transcripts documenting interviews with professionals who have made significant contributions to the field of reproductive health around the world. Forty-one interviews are included, which cover a diverse array of subject content, such as reproduction in law and policy, family planning, contraception, abortion, and HIV/AIDS, from approximately 1965-2005. PDF format transcripts can be accessed by interviewee name and browsed by brief biographical descriptions.

Profiles in Science (National Library of Medicine)

<https://profiles.nlm.nih.gov/>

The U.S. National Library of Medicine maintains the Profiles in Science platform, a curated interface focusing on significant biomedical and public health researchers. Forty-one profiles are currently available, including brief biographical information and select digitized archival content accessible through basic search and browse functions. Scientists profiled include Charles R. Drew (surgery, blood banking), Michael Heidelberger (immunology), Barbara McClintock (genetics), Victor McKusick (genetics), Maxine Singer (molecular biology), and Oswald Theodore Avery (bacteriology, immunochemistry), among many others.

Sabin, Albert B. - Albert B. Sabin Archives (Digital Resource Commons, University of Cincinnati)

<https://drc.libraries.uc.edu/handle/2374.UC/664209>

Albert B. Sabin (1906-1993) was a prolific medical researcher whose most famous contribution to

science was the development of the widely successful oral polio vaccine. Sabin's extensive paper collection is archived at the University of Cincinnati, and through a National Endowment of the Humanities grant, a significant portion is now digitized and available online. The collection of over 34,000 and growing digital items is fully searchable and navigable through nine topical series. A link to the full collection finding aid is also provided, which enhances discovery. Materials include extensive professional correspondence, reports and project documents, photographs, oral history transcripts, and writings from throughout Sabin's research career.

Sutherland, Earl W. - Earl W. Sutherland Research Notebooks (Louis Calder Memorial Library, University of Miami)

<http://calder.med.miami.edu/Sutherland/index.htm>

The University of Miami is home to a research notebook collection from Earl W. Sutherland (1915-1974), a pharmacologist, physiologist, and biochemist who was awarded the 1971 Nobel Prize in Physiology or Medicine for discoveries concerning the mechanisms of the action of hormones. A collection of 93 of Sutherland's notebooks documenting the progress of his Nobel Prize winning research from 1940-1969 is digitized and available online, supplemented by a copy of his Nobel lecture and a related bibliography. Content can be browsed by book number or searched using subject, date, or other terms that are present in item-level metadata. These materials provide a detailed look into the progress of one of Sutherland's key scientific achievements.

Physics

Bassi, Laura & Veratti Family - Bassi-Veratti Collection (Stanford University Libraries)

<https://bv.stanford.edu/>

Stanford University Libraries is part of a collaborative multi-year project aiming to produce a globally accessible digital version of the Archiginnasio of Bologna's Bassi-Veratti archival collection, which documents the work and life of Laura Bassi in addition to the broader Bassi and Veratti families. Laura Bassi was a pioneering female Italian scientist in the 18th century who studied and taught in the sciences, primarily physics. Documents include correspondence, printed writings, accounting and legal papers, poems, and personal and biographical items; materials are in Italian. Documents are accessible through searching, browsing, or geographically via an integrated Google map.

Bohr, Niels - Niels Bohr Archive (Niels Bohr Institute, University of Copenhagen)

<http://www.nbarchive.dk/collections/>

The Niels Bohr Archive (NBA) holds the archival papers of pioneering physicist Niels Bohr (1885-1962), in addition to historical materials from a number of other influential physicists and the Niels Bohr Institute. Openly available digitized materials include a collection of 1,200 digitized photographs (thumbnails) and 11 digitized, transcribed, and translated (English) documents related to a 1941 meeting between Niels Bohr and Werner Heisenberg, who at the time was the physicist heading Nazi Germany's nuclear weapon project. Additional materials are digitized and available, but researchers must be approved for access through a straightforward application process detailed on the NBA website. Post-approval, researchers may access a selection of Bohr's scientific and personal correspondence, manuscripts, political papers, and audio recordings of lectures and talks using straightforward browse and/or search functions. Digitized content is also available with approval from the collections of physicists Aage Bohr, Robert Bruce Lindsay, Christian MafÅller, and LÅfÅon Rosenfeld, with more digitization planned for the future.

Chernobyl, The Destroyed Russian Nuclear Reactor (University Libraries, University of Washington)

<http://content.lib.washington.edu/chernobylweb/>

The University of Washington's (UW) digital Chernobyl collection frames the 1986 Chernobyl nuclear

disaster from the perspective of UW Emeritus Professor William Zoller (b. 1943), who traveled to the disaster site at the request of the International Atomic Energy Agency for the United Nations. The collection includes 114 items that were digitized from slides used by Zoller for communication purposes, and they document key aspects of the disaster and subsequent remediation response. Material formats include photographs, graphics, and notes, each with a detailed description provided by Zoller. Users may search the collection or browse all items, with the option to use photographer, date, and type limiters to assist in navigation.

Curie, Marie & Pierre - Marie & Pierre Curie Materials (Europeana)

Marie Curie: <http://www.europeana.eu/portal/search.html?query=Marie+Curie>

Pierre Curie: <http://www.europeana.eu/portal/search.html?query=Pierre+Curie>

Europe's aggregate digital archival database Europeana provides a convenient platform through which to explore more than 600 digitized materials documenting the life and work of Marie Skłodowska (1867-1934) and Pierre Curie (1859-1906), the originals of which are held by numerous repositories around Europe. Both Marie and Pierre Curie were awarded Nobel Prizes in Physics (Marie and Pierre) and Chemistry (Marie) for their groundbreaking research, most notably the discovery and further investigation of natural radioactivity. The largest collection of the Curies' archives is housed at the National Library of France, but due to radioactive contamination that will be present for over 1,000 years, the collection is not openly available or fully digitized. Europeana does not provide a landing page or name authority records for record creators, thus links provided correspond to simple name searches. Through Europeana, materials can be further explored through additional targeted searching or browsing, which may be further navigated through the use of limiters including media format, use restriction status, providing country, institution, or language. Digital items are primarily research notebooks and photographs covering topics such as natural radioactivity, uranium, polonium, and radium. While Europeana's item-level description includes English language metadata, most of the Curie material is in French, which may provide a use limitation for researchers without French language fluency.

Einstein, Albert - Einstein Archives Online (Albert Einstein Archives, Hebrew University of Jerusalem)

<http://www.alberteinstein.info/>

Einstein Archives Online is a collaborative project bringing together physically dispersed Albert Einstein (1879-1955) archival materials held by the Hebrew University of Jerusalem's Albert Einstein Archives and the Einstein Papers Project at the California Institute of Technology. The unified digital collection includes 2,000 key fully digitized items in addition to metadata describing an additional 80,000 documents not yet digitized. Materials include scientific notes, writings, and correspondence, as well as personal letters and travel diaries from the famed theoretical physicist. The interface includes a searchable database as well as a gallery that features especially noteworthy items, such as one of only three known original manuscripts containing Einstein's groundbreaking $E=mc^2$ formula. A portion of digitized materials is not openly accessible to the public, but researchers and educators are encouraged to contact the repository for access.

Fermi, Enrico - Enrico Fermi Collection (University of Chicago Library)

<http://guides.lib.uchicago.edu/fermi>

The University of Chicago Library holds the papers of physicist Enrico Fermi (1901-1954), winner of the 1938 Nobel Prize in Physics "for his demonstrations of the existence of new radioactive elements produced by neutron irradiation, and for his related discovery of nuclear reactions brought about by slow neutrons." Fermi went on to become a researcher with the Manhattan Project and leader of the research team that developed the first self-sustaining nuclear chain reaction. A portion of the Fermi Collection is digitized and available through a curated web portal, including notebooks on nuclear physics, quantum mechanics, cosmic ray theory, and other topics, as well as key letters and notes documenting pivotal elements of Fermi's career and relationships. Content may be browsed through the

"Enrico Fermi Collection" tab or "Image gallery" tab, though limiting options are not available.

Goudsmit, Samuel A. - Samuel A. Goudsmit Papers (Niels Bohr Library & Archives, American Institute of Physics)

<http://repository.aip.org/islandora/object/nbla%3AAR2000-0092>

The Samuel A. Goudsmit Papers collection at the Niels Bohr Library & Archives within the American Institute of Physics (College Park, MD) is fully digitized and available online. Content is navigable via search, a browsable interface, and a standard finding aid. Goudsmit's (1902-1978) most famous contribution to the field of physics was his joint proposition of the concept of electron spin in 1925, and this plus many other aspects of his life and work are documented through this substantial 75 box archival collection. The largest portion of materials are correspondence, in addition to notes, memoranda, teaching and lecture materials, manuscripts, published writings, and audio-visual content. Digital items may be accessed through simple and advanced search or browsed by hierarchical topical archival series, folder, and item links.

Hubble, Edwin Powell - Edwin Powell Hubble Papers (Huntington Library)

Digital content: <http://hdl.huntington.org/cdm/search/searchterm/Hubble,%20Edwin%20Powell/mode/exact>

Finding Aid: <http://www.oac.cdlib.org/findaid/ark:/13030/tf7b69n8rd/>

collection of acclaimed astronomer Edwin Hubble's (1889-1953) papers is held by the Huntington Library's (San Marino, CA) Manuscripts Department. Over 800 of the Hubble collection items are digitized and available online through the Huntington's digital library. The digital materials consist of photographs, correspondence, and manuscripts, which document Hubble's work and relationships within and outside the scientific community, including his groundbreaking contributions to the concept of extragalactic astronomy. The Hubble Papers' finding aid and digital content are not connected by hyperlink, but the finding aid on the Online Archive of California platform can be used as a reference to search materials on the digital library interface; the most effective search method is by manuscript item number, i.e., "mssHUB 15".

Newton, Isaac - Isaac Newton Papers (Cambridge University Library)

<https://cudl.lib.cam.ac.uk/collections/newton>

The Cambridge University Library holds the largest collection of the scientific works of scientist and mathematician Isaac Newton (1643-1727), many of which are digitized and available through the Cambridge Digital Library. Newton's work and manuscripts are primarily contained within two archival collections accessible through a single digital portal--the Portsmouth Collection (MS Add.3958-4007), which is fully digitized, and the Macclesfield Collection (MS Add.9597), which is partially digitized as of early 2017. The digitized manuscripts contain writings, notes, and correspondence on a diverse range of subjects including astronomy, optics, chemistry, and mathematics. Many of Newton's papers related to the writing of his work *Principia* are included in the digital collection. Materials may be searched or browsed, which may be done in tangent with the corresponding Portsmouth and Macclesfield Collection finding aids linked from the Isaac Newton Papers home page.

Oral History Interviews (Niels Bohr Library & Archives, American Institute of Physics)

<https://www.aip.org/history-programs/niels-bohr-library/oral-histories>

The Niels Bohr Library & Archives' digital repository provides access to a growing collection of oral history transcripts and audio excerpts from interviews conducted with physicists, documenting their experiences in the field over the past century. The collection began through a National Endowment for the Humanities digitization grant in 2007, and through ongoing efforts, nearly 1,500 transcripts and over 80 audio excerpts are now available online. The oral history transcript and audio content provides a unique, personal perspective into the work, experiences, and relationships of a diverse set of physicists working in a range of environments and subject areas, and each record includes an abstract with succinct biographical information for context. Content may be navigated through a simple search

or browsed by specific interviewee name.

Pauli, Wolfgang - Pauli Archive (CERN Scientific Information Service)

http://library.web.cern.ch/archives/Pauli_archive/guide

The papers of theoretical physicist Wolfgang Pauli (1900-1958), a pioneer in the field of quantum theory, are housed within the archives at CERN, the European Organization for Nuclear Research (Meyrin, Switzerland). The archival collection provides complex insights into Pauli's life and work, including his development of the Exclusion Principle, for which he was awarded the Nobel Prize in Physics in 1945. Of the more than 3,800 items described and digitally indexed, a large majority are fully digitized and accessible through browsing or search. Item-level descriptive metadata is relatively robust, including brief abstracts describing many materials. The interface is in English, but there are a substantial number of German language documents. Item formats include correspondence, lecture notes, research notes and calculations, manuscripts, photographs, and commemorative materials.

Shull, Clifford Glenwood - Clifford Glenwood Shull Collection (Carnegie Mellon University Archives)

<http://diva.library.cmu.edu/Shull/>

The Carnegie Mellon University Archives (Pittsburg, PA) holds the papers of alumnus Clifford Shull (1915-2001), who won the 1994 Nobel Prize in Physics for his contributions in the development of a groundbreaking neutron diffraction technique. Shull was also a longtime researcher and faculty member at the Massachusetts Institute of Technology (MIT). A high percentage of materials in Shull's 23 linear foot archives collection are digitized and available online. Content is organized into series based on the affiliation for Shull's work (New York University, Oak Ridge, MIT) and format. Content includes research and teaching materials, correspondence, publications and manuscripts, notes, awards and affiliated documents, and a tribute video. Content is available through hierarchical browsing and search.

Szilard, Leo - Leo Szilard Papers (Special Collections & Archives, University of California, San Diego)

<http://library.ucsd.edu/dc/collection/bb0752385q>

The papers of nuclear physics pioneer Leo Szilard (1898-1964) are housed at the University of California, San Diego. The majority of collection items, over 1,800, are digitized and publicly available. The papers lend insight into Szilard's work, most famously that with the Manhattan Project, atomic bomb development, and nuclear arms control. Content includes articles, research notebooks, notes, project and research files, correspondence, and photographs. Navigation within the collection is straightforward, with options to search and browse at the item-level or access content through the hyperlinked finding aid.

STEM General

American Museum of Natural History Digital Special Collections (American Museum of Natural History)

<http://images.library.amnh.org/digital/index.php>

The American Museum of Natural History Research Library maintains an image-focused digital library of archival photographic images, art, rare book plate illustrations, maps, memorabilia, and plant specimens. Digital objects are organized by subject, with uncomplicated browse and search navigation. The interface also includes links to a number of curated digital exhibits, which integrate subject-based browsing to relevant digital collection materials. Overall, this resource helps to visualize aspects of natural history research over time.

American Philosophical Society Digital Library (American Philosophical Society)

<http://diglib.amphilsoc.org/>

The online Digital Library of the American Philosophical Society (Philadelphia, PA) makes available a

selection of digitized primary source materials organized by subject. Digital collections are navigable by format, including audio, graphics, text, and video, with graphics representing the most expansive holdings; cross-format search is also an option. Subject areas span the history of natural and physical sciences as well as other aspects of social science and history. Significant collections of photographs and drawings are available and organized on a subject basis, including biology, genetics, eugenics, math and physics, medical history, and natural history. The digital library contains a strong printed map collection and over 80 digitized items related to the Lewis and Clark Expedition, including meticulous journals with ecological observations.

CalTech Digital Collections (The CalTech Archives, California Institute of Technology)

<http://archives.caltech.edu/collections/digital-collections.html>

The California Institute of Technology Archives (Pasadena, CA) maintains a relatively modest yet growing digital collection that lends insights into the scientific and technological contributions of university affiliates over time. Currently available digital materials include images, oral history transcripts, laboratory notebooks, and the papers of aeronautical engineer Paul B. MacCready (1925-2007). The sizable image collection contains over 10,000 items, primarily photographs with a smaller number of drawings, postcards, blueprints, maps, notes, and photographed artifacts. The MacCready papers is an extensive digital collection documenting MacCready's life and engineering career, including work on human powered aircraft and early solar vehicles. Collection-specific basic and advanced search is supported, and content may be browsed by name, subject, or in the case of the MacCready papers, through a hyperlinked finding aid.

Digital Public Library of America

<https://dp.la/>

The Digital Public Library of America (DPLA) is a broad-ranging aggregate database for openly available digital resources from libraries, archives, and museums. Though this database is not STEM specific, many items relevant to STEM subject areas are present, with the expectation that the collection will also continue to grow. The database can be unwieldy due to the sheer size of its searchable content, but search and browse functions are highly dynamic, with options to navigate or filter by institution, subject term, geographic area, or time period. Geographic and temporal browsing are enhanced by graphic visualizations. Most digitized materials are hosted through home institution repositories, but the DPLA provides an extensive single search interface through which to connect with primary source materials primarily at the item level.

ECHO Cultural Heritage Online (Max Planck Institute for the History of Science)

<http://echo.mpiwg-berlin.mpg.de/home>

The Max Planck Institute for the History of Science (Berlin, Germany) founded ECHO, European Cultural Heritage Online, which is essentially a digital humanities project that aims to unite digital documentary heritage collections across Europe. ECHO is an aggregate database providing a single search and subject browsing interface for historic digitized books, artifacts, and archival documents. The database includes a strong representation of historical scientific and mathematical content in European digital repositories, including rare books and manuscripts, notebooks, correspondence, scientific drawings and computations, and more. Highlights include links to a collection of digitized cuneiform tablets (Mesopotamian writing) documenting some of the earliest extant written mathematical computations, a collection of notebooks from Albert Einstein and Hermann Minkowski, and the manuscripts of astronomer and mathematician Thomas Harriot.

Library of Congress Digital Collections: Science & Technology (Library of Congress)

<https://www.loc.gov/collections/?fa=subject%3Ascience+%26+technology>

The Library of Congress provides access to a collection of digitized archival materials relevant to Science and Technology, with more digitization of the library's expansive collections expected in the

future. Nineteen digital STEM collections are currently available, with subject content including engineering drawings, astronomy, conservation, transportation technology, with most coverage concentrated on the 19th and early 20th centuries. Materials include photographs, drawings, notes, writings, correspondence, audiovisual media, maps, and others. Content may be browsed by collection, subject, and format, and the search function also allows for further targeted discovery in science and other collections.

Linda Hall Library Digital Collections (Linda Hall Library)

<http://lhdigital.lindahall.org/cdm/>

The Linda Hall Library (Kansas City, MO) has a strong history of science and technology collection, a portion of which has been digitized for online access. Nearly 250,000 images currently exist in the collection, primarily representing manuscripts and rare books, in addition to maps and photographs. Items of note in the collection include a handwritten notebook by William Herschel created during his process of developing an innovative telescope, notebooks from Aurin B. Nichols documenting the engineering and building of the Panama Canal, and many maps documenting the engineering and construction of railway systems around the world. Digital items are navigable by collection or through an all item search or browse, with subject, creator, and collection limiters.

Smithsonian Digital Library: Natural and Physical Sciences (Digital Collections, Smithsonian Libraries)

<http://library.si.edu/digital-library/natural-and-physical-sciences>

The Smithsonian Libraries maintain a curated access point to digital library and archival collection holdings related specifically to natural and physical sciences. This web portal provides a single point of connection to more than 25 Smithsonian subject collections and indices. The collections primarily represent highly curated digital exhibits. Subject areas of note include extinct birds of North America, historical scientific instruments, and early explorations. Though many of the digital exhibits have outdated site designs outside the bounds of current trends and standards, they continue to remain relevant by bringing together unique resources that aren't easily found elsewhere. Because individual collections are curated through largely unique design, navigation varies, though the exhibits were all developed with the intention of being user-friendly educational resources.

Smithsonian Library and Archival Exhibitions on the Web (Smithsonian Libraries)

<http://www.sil.si.edu/SILPublications/Online-Exhibitions/intro.htm>

The Smithsonian Libraries provide access to an international index of online exhibitions created and maintained by libraries, archives, and related institutions, both in the sciences and other fields. This resource has basic search functions; options to browse by geographic location, institution, or exhibition title; as well as a list of recently added collections. Each exhibition record includes brief information about the providing institution, location, subject focus, and a link to the original resource. Though the database does contain a relatively high percentage of broken collection links, it provides a convenient access point by which to search for known digitized archival materials, and link issues may be sidestepped by querying collection titles through a general search engine.

World Digital Library (UNESCO & United States Library of Congress)

<https://www.wdl.org/en/>

The World Digital Library (WDL) is an international database providing open access to digitized archival and other historical resources from around the world. Over 15,000 items from 193 countries are digitized and available through WDL as of early 2017, with creation dates ranging from 8000 BCE to 2000 CE. Archival material formats include manuscripts, photographs, maps, video and sound recordings, newspapers, as well as published works. Content may be searched using simple terms or navigated through robust browsing options, including by interactive timelines, maps, or by place, time period, topic, type/format, language, and institution. To easily review STEM related content, users may

browse by topic, with options to explore subject collections on computer science, natural sciences, mathematics, and technology; each category is also further divided into subtopic. Digitized items are described through detailed metadata, including thorough summaries, suggestions for related items, and linked authority control that enhances browsing. A particular highlight includes "Arabic and Islamic Science and Its Influence on the Western Scientific Tradition," a curated, interactive exhibit that may be accessed through the "Themes" tab.

References

Archive Finder. [Internet]. [Updated 2016]. Ann Arbor (MI): ProQuest LLC. [cited 2016 Nov 12] Available from <http://archives.chadwyck.com/>

ArchiveGrid. [Internet]. [Updated 2016]. Dublin (OH): Online Computer Library Center, Inc. [cited 2016 Nov 12] Available from <https://beta.worldcat.org/archivegrid/>

Anderberg, L. 2015. STEM undergraduates and archival instruction: a case study at NYU Polytechnic School of Engineering. *The American Archivist* 78(2):548-566. DOI: [10.17723/0360-9081.78.2.548](https://doi.org/10.17723/0360-9081.78.2.548)

Brown, A.H., Losoff, B. & Hollis, D.R. 2014. Science instruction through the visual arts in special collections. *Portal: Libraries and the Academy* 14(2):197-216. DOI: [10.1353/pla.2014.0002](https://doi.org/10.1353/pla.2014.0002)

Bunde, J. & Engel, D. 2010. Computing in the humanities: an interdisciplinary partnership in undergraduate education. *Journal of Archival Organization* 8(2):149-159. DOI: [10.1080/15332748.2010.519993](https://doi.org/10.1080/15332748.2010.519993)

Enoch, J. & VanHaitsma, P. 2015. Archival literacy: reading the rhetoric of digital archives in the undergraduate classroom. *College Composition and Communication* 67(2):216-242.

Fox, A.J. & Cooper, A.P.R. 1998. Climate-change indicators from archival aerial photography of the Antarctic Peninsula. *Annals of Glaciology* 27(1):636-642.

Hinchliffe, L.J. & Prom, C.J., editors. 2016. Teaching with Primary Sources. Chicago (IL): Society of American Archivists. 204 p. (Trends in archives practice; modules 9-11).

Indiana University Center for Postsecondary Research. 2015. The Carnegie Classification of Institutions of Higher Education [Internet]. 2015 edition. Bloomington (IN): IUCPR. [cited 2016 Oct 15] Available from <http://carnegieclassifications.iu.edu/>

Leslie, C. & Anderberg, L. 2015. Innovating with history: how an archival intervention diminishes Snow's "dangerous" divides. *Double Helix*. 3(2015):1-32.

Leslie, C. & Anderberg, L. 2016. Making history active: archival interventions for engineering education. Paper presented at: 123rd ASEE Annual Conference & Exposition; New Orleans, LA. DOI: [10.18260/p.25663](https://doi.org/10.18260/p.25663)

McClenachan, L., Cooper, A.B., McKenzie, M.G. & Drew, J.A. 2015. The importance of surprising results and best practices in historical ecology. *BioScience* 65(9):932-939. DOI: [10.1093/biosci/biv100](https://doi.org/10.1093/biosci/biv100)

McClenachan, L., Ferretti, F. & Baum, J.K. 2012. From archives to conservation: why historical data are needed to set baselines for marine animals and ecosystems. *Conservation Letters* 5(5):349-359. DOI: [10.1111/j.1755-263X.2012.00253.x](https://doi.org/10.1111/j.1755-263X.2012.00253.x)

McClurken, J.W. 2011. Waiting for web 2.0: archives and teaching undergraduates in a digital age. In: Theimer, K., editor. *A Different Kind of Web: New Connections between Archives and Our Users*. Chicago (IL): Society of American Archivists. p. 243-254.

Montoya, R.D. 2016. A classification of digital emergence: a critical approach to the production of digital objects in special collections. *Canadian Journal of Academic Librarianship* 1(1):42-59.

Pearce-Moses, R. 2005. *A Glossary of Archival and Records Terminology*. Chicago (IL): Society of American Archivists. 433 p. (Archival fundamentals series; II).

Rose, A.T. 2015. Using a former governor's archives as a source of scholarship in engineering technology. Paper presented at: 122nd ASEE Annual Conference & Exposition; Seattle, WA. DOI: [10.18260/p.24987](https://doi.org/10.18260/p.24987)

Rose, A.T. 2016. Using archival materials to study the influence of public policy on a hydroelectric project. Paper presented at: 46th annual IEEE Frontiers in Education Conference; Eire, PA. DOI: [10.1109/FIE.2016.7757634](https://doi.org/10.1109/FIE.2016.7757634)

Simmons, J. 1996. *The Scientific 100: A Ranking of the Most Influential Scientists, Past and Present*. Secaucus (NJ): Carol Publishing Group. 504 p.

Smith, C. & Lawson N. 2012. Identifying extreme event climate thresholds for greater Manchester, UK: examining the past to prepare for the future. *Meteorological Applications*. 19(1):26-35. DOI: [10.1002/met.252](https://doi.org/10.1002/met.252)

Swaby, R. 2015. *Headstrong: 52 Women Who Changed Science - and the World*. New York (NY): Broadway Books. 273 p.

Theimer, K. 2012. Archives in context and as context. *Journal of Digital Humanities* 1(2):65-71.

Theimer, K. 2015 Mar 20. Examples of archival & special collections being used for current scientific purposes? [Internet]. ArchivesNext. [cited 2016 Nov 23] Available from <http://archivesnext.com/?p=3880>

Widener, J.M. & Reese, J.S. 2016. Mapping an American college town: integrating archival resources and research in an introductory GIS course. *Journal of Map & Geography Libraries* 12(3):238-257. DOI: [10.1080/15420353.2016.1195783](https://doi.org/10.1080/15420353.2016.1195783)



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).