

ESSAY REVIEWS

Clio Electric

Online Resources in Post-1750 History of Science, Medicine, and Technology

*By Brian Dolan**

Dependency on the digital world is already with us, and it is here to stay. It is not yet ubiquitous. It is unevenly distributed. We all know colleagues who eschew the Web and have never opened Outlook. They also do not understand why others think it is necessary to have “Power” to make a “Point.” However, there is growing recognition that the nature of scholarly communication and research is changing, to the degree that Web dependency is not only shaping university policy—largely for economic and spatial reasons—but working itself into an ideology of “democratized access” to information and a goal to “reintegrate the cultural record” by digitizing library and museum collections that will make “the totality of our accumulated global cultural heritage” available through a common Web-based interface. This is not the rhetoric of the commercial search engine Google, with its expanding catalogue of over 10 billion Web pages and visions of digitally scanning every book on the planet; rather, it comes from a recent American Council of Learned Societies Commission report on “Cyberinfrastructure for the Humanities and Social Sciences.”¹

Citing examples such as the UC Berkeley–based Electronic Cultural Atlas Initiative (ECAI), which provides a technological infrastructure “to enhance understanding and preservation of human culture,” the ACLS commission reported on the possibility, if not “requirement,” of creating “an online environment that cultivates, rather than frustrates or distorts, the richness of human experience, the diversity of human languages and cultures, and the full range of human creativity.”² The authors point out that one impediment to fulfilling this vision is the inertia in the humanities when it comes to adapting to new scholarly infrastructures of this sort. This foot-dragging stands in contrast to the situation in the sciences, where a 1988 study by the Research Libraries Group (RLG) found that

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¹ Draft Report of the ACLS Commission, “Cyberinfrastructure for the Humanities and Social Sciences,” 5 Nov. 2005, <http://www.acls.org/cyberinfrastructure/cyber.htm>.

² Electronic Cultural Atlas Initiative, <http://ecai.org/>; and ACLS Commission, “Cyberinfrastructure for the Humanities and Social Sciences,” p. 4.

scholars in science disciplines were eager to use technology to disseminate conference papers, research results, and technical reports.³ In fact, it was and remains not simply a question of comfort with and enthusiasm for technology. Rather, the economic advantages of switching to Web-based or electronic forms of scholarly communication facilitated the rapid transformation to Web dependency (more on this below). Very similar considerations now apply in the humanities, and they are already creating pressure for historians to get with the e-program.

What follows is a short sketch of some Web sites that provide innovative and substantive resources—relating to both primary and secondary sources—of relevance to the fields of history of science, technology, and medicine. I begin by mentioning a few “e-scholarship” endeavors, supported through multi-institutional collaborations for the promotion of open access to scholarly books and articles, with brief discussions of the rationale behind such projects. I then turn to some examples that provide a glimpse of the range of information that is increasingly available online, such as primary personal manuscript material, museum collections, and comprehensive, searchable databases. This report is all too brief, and it is biased toward particular areas that I have concentrated on for my own research, but it does offer a description—however partial—to begin dialogue with others about the rich pickings on offer to our community.

Not so long ago, colleagues I spoke to at venues such as the annual HSS meetings were highly skeptical that scholarly publishing would move away from the conventional print medium and enter the world of e-publishing. This is an attitude no doubt largely owing to historians’ natural fetish for the book, but it also accords with publishers’ own views that people prefer the printed page. (For the record, I agreed.) There was too much of a vanity press feeling to e-articles, as well as an unsatisfactory sense of impermanence to them. E-publishing does not permit authors to display their trophies on the bookshelf. But the economic problems incurred with the costs of printing, distributing, and storing printed texts began to raise questions about the long-term sustainability, if not the practicality, of admonishing scholars to publish or perish. According to a study by Peter Lyman and Hal Varian at UC Berkeley, each year enough new information is produced in different media around the world to match the amount of information stored in the Library of Congress 37,000 times over. That is equivalent to each one of the 6.3 billion people on earth producing 800 megabytes—30 feet of bookshelf space—of information (scholarship, entertainment, blogs, etc.) every year.⁴ And the authors estimate that this figure increases by 30 percent every year. However one wants to classify this material—from cultural resources to junk mail—the point is that it represents a growing digital portrait of who we are, what we are interested in, and how we display ourselves.

Ironically, it was the willingness of scholars in the sciences to publish electronically that precipitated a crisis of sorts among publishers that has now led to the strong encouragement that the model be accepted in the humanities as well. This encouragement is coming from the many university libraries struggling with reduced budgets and constraints on space, as well as from scholars promoting the concept of “open access” to scholarly resources. This leads me to the first example of the online resources we increasingly encounter and will be asked to review: our own publications.

³ <http://www.rlg.org/index.php>.

⁴ Peter Lyman and Hal Varian, “How Much Information? 2003,” <http://www.sims.berkeley.edu:8000/research/projects/how-much-info-2003/index.htm>.

CALIFORNIA DIGITAL LIBRARY ([HTTP://WWW.CDLIB.ORG/](http://www.cdlib.org/))

As one of the ten University of California libraries that worked collaboratively to launch the California Digital Library (CDL), the UC San Francisco library issued a report to its faculty explaining why it strongly backed the creation of the “eScholarship program.” Fundamentally, the report claimed, scholarly communication was chasing an “unsustainable trend.” Rising costs were killing access to scholarship. Between 1986 and 2002, for instance, the cost of journal subscriptions for the campus rose 227 percent.⁵ Moreover, the library was spreading its budget thin to subscribe to 58 percent more journals and purchase 50 percent more books. Storage and display space quickly became a problem—as did budgetary cutbacks across the UC system. It was thought that obtaining online editions of journals might solve a few problems. Not so. Subscribing to online versions of journals is often far more expensive than subscribing to the printed version. One notable example, *Science Magazine* costs \$500 in print, \$11,000 online. The publishers’ rationale seems to be that online versions will be more heavily used than printed versions, thus legitimating the increased subscription cost. Furthermore, publishers sometimes bundle titles together, requiring libraries to take many at a higher price rather than pick and choose.

As a result, a UC-wide Faculty Senate Advisory Committee was established to advise its faculty on copyright management and to foster the development of the eScholarship program. Operated under the aegis of the California Digital Library, which is seen as a complement to each campus’s physical library, the e-program encourages faculty who publish to retain copyright and deposit a copy of their work digitally at CDL. It also offers a full-spectrum e-publishing platform for original peer-reviewed articles, edited volumes, and monographs and the resources to create new e-journals. Add up all faculty and all their publications, and at one networked institution alone the scholarship generated and made available freely online would represent a substantial challenge to the conventional publishing model. But the California Digital Library is not the only corporate endeavor to promote scholarly online publishing.

ACLS HISTORY E-BOOK PROJECT ([HTTP://WWW.HISTORYEBOOK.ORG/INDEX.HTML](http://www.historyebook.org/index.html))

In 1999, the American Council of Learned Societies inaugurated its History E-Book Project. This project is a collaboration among eight scholarly societies, including the American Historical Society and the Society for the History of Technology, and seventy-five university presses to encourage and assist in the production and archival preservation of scholarly e-books. An advisory board helps to determine which of approximately 250 previously published books will be converted into electronic format each year, as well as encouraging historians to plan and write e-books. Since the first titles were uploaded in 2002, over 1,000 have become available through individual and institutional subscription. The site is keyword searchable, and the titles are grouped by subject category for browsing. The infrastructure that the History E-Book Project is building permits referenced titles to be hyperlinked together, creating a new gateway to cited material, and authors are asked to identify six to eight monographs that have had a significant impact in shaping the conceptual and analytical issues relating to their topic; these too (if permissible) are uploaded, thus forming a unique category of “clustered” books. Among the works in this collection that

⁵ http://osc.universityofcalifornia.edu/facts/econ_of_publishing.html.

are drawn from the history of science, technology, and medicine are titles by Charles Singer, Lynn White, Thomas Hughes, Wiebe Bijker, Bruno Latour, and many others.

GUTENBERG-E ([HTTP://WWW.GUTENBERG-E.ORG/](http://www.gutenberg-e.org/))

Also in 1999, with a grant from the Andrew W. Mellon Foundation, the American Historical Association and the electronic publishing staff at Columbia University Press began publishing digital versions of prizewinning Ph.D. dissertations. The Gutenberg-e project was part of then-AHA president Robert Darnton's effort to "save the historical monograph," and the strategy to promote young scholars' first books in this way met with mixed reviews.⁶ Because of the creative ways that new scholarship can be presented, taking advantage of the multimedia capabilities of electronic publishing, some readers have been left uncertain about what to do when "reading" becomes "interacting" with the page. This is bound to become more complex, and it underscores the necessity of involving editors trained differently than those traditionally employed to copyedit books. It also raises an interesting issue about another business model for e-publishing. One might assume that e-publishing occurs instantly, with the uploading of the file to the Web site, and that without all the costs that are involved in the production of printed books lots of money will be saved. Yet the Gutenberg-e project records that it takes about three years from "manuscript" delivery to e-publication, and it is suggested that the cost of designing, editing, and maintaining the books is not markedly cheaper. The idea here is that the press will recoup its investment in the time-honored fashion: by targeting sales to some 500 university libraries. Yet instead of purchasing individual books, institutions pay a subscription fee of \$195 a year that allows their patrons to access the dozen or so titles published. How the business model will fare in the future remains to be seen; but, despite lingering uncertainty about how to classify the product for the purposes of academic promotion, early evidence suggests that the reputation of "e-scholars" has not been hindered by their pioneering publications. And when we are looking for "raw data"—images, artifacts, manuscripts—institutional sites of another sort are making a wealth of material available.

VIRTUAL MUSEUMS

Historians of science are well versed in the "artifactual" nature of the discipline. Instruments, models, and other apparatus have long been an important part of the study of the craft of science. Now many artifacts can be explored by visiting online exhibitions and galleries hosted by museums and other institutions. The History of Science Museum at Oxford University currently has fourteen online exhibitions that represent a virtual record of past exhibitions at the museum.⁷ Each one contains dozens of high-resolution pictures of the display objects, full textual descriptions, and—in many cases—additional essays explaining the history and context of the collection. Virtual galleries not only showcase earlier exhibitions but allow many less-visited museums a chance to publicize their collections. The "Museum of Questionable Medical Devices" (housed in the Science Museum of Minnesota) might fit this profile.⁸ The Web site provides pictures, descriptions, brief

⁶ See, e.g., Patrick Manning, "Gutenberg-e: Electronic Entry to the Historical Professoriate," *American Historical Review*, 2005, 109(5), at <http://www.gutenberg-e.org/aboutframe.html>.

⁷ <http://www.mhs.ox.ac.uk>.

⁸ <http://mtn.org/quack/welcome.htm>.

histories, and links to other sites that illustrate the history of quackery in medicine, from Kellogg's Battle Creek "vibratory chair" to the shoe-fitting x-ray device. The National Library of Medicine (National Institutes of Health) also provides comprehensive visual and textual content in its "Exhibitions in the History of Medicine," more than thirty of which are now online.⁹ Other parts of the Web site offer biographical information on leaders in biomedical science ("Profiles in Science"); and one can browse or perform keyword searches in the "Images from the History of Medicine" database, which yields pictures that are not of publishable quality but are useful pedagogically. The Medical Photographic Library at the Wellcome Trust Web site has similar search capabilities and includes featured photographic exhibitions.¹⁰

BIOGRAPHICAL RESOURCES

Many of the museums that provide online resources in the history of science, technology, and medicine showcase collections that are unique to individual institutions. Increasingly, however, multiple institutions and repositories collaborate to provide scanned or transcribed manuscripts of individuals. The Complete Works of Charles Darwin Online is a splendid example.¹¹ Designed and directed by John van Wyhe at the University of Cambridge and funded from a grant awarded to James Secord (Cambridge) and Janet Browne (Wellcome Trust), the Darwin Online project integrates all of Darwin's writings—42 volumes written or edited by Darwin, 246 shorter publications, and private manuscripts that are not being published separately by the Darwin Correspondence Project—and makes them freely available, with full search capabilities and a bibliographic catalogue. In France, working under the auspices of CNRS, Pietro Corsi is putting the *oeuvre* of Jean-Baptiste Lamarck online; this site contains "secondary" source biographical information as well as certain letters, articles, and memoirs.¹² A similar project is under way at the University of Paris for the *oeuvre* of Antoine Lavoisier.¹³

In Sweden, Project Linnaeus is being carried forward under the aegis of the Swedish Linnaean Society, in collaboration with the Royal Swedish Academy of Science and the Linnean Society of London; it is based at the University of Uppsala. An international team was assembled to edit (transcribe and annotate) a corpus of 7,000 letters to and from the eighteenth-century botanist, and plans also include the creation of an electronic edition of his collected works.¹⁴ The more modern period is represented by the Einstein Papers Project at CalTech: it features the Einstein Archives Online, with images of digitized manuscripts, scientific and nonscientific writings, and travel diaries.¹⁵

These few projects merely allude to the range of primary research material—printed and manuscript—now accessible online to the history of science community. Archivists are beginning to see that their digital collections provide a means of advertising what they have; for scholars, they are resources that allow a considerable amount of work to be done before one must apply for grants and wait for a sabbatical to visit the archive. Making collections available online is not a barrier to the intellectual journey of exploration and

⁹ <http://www.nlm.nih.gov/>.

¹⁰ <http://library.wellcome.ac.uk/>.

¹¹ <http://darwin-online.org.uk/>.

¹² <http://www.crhst.cnrs.fr/i-corpus/lamarck/>.

¹³ <http://histsciences.univ-paris1.fr/i-corpus/lavoisier>.

¹⁴ <http://www.c18.rutgers.edu/pr/lc/proj.lin.html>.

¹⁵ <http://www.alberteinstein.info/>.

discovery but, rather, a means of facilitating research and opening up sources in places that might be difficult to visit. For instance, I have noticed that two sites often appear in literature relating to China. “History On-line” (in Chinese) provides resources on Chinese and Taiwanese history, with search engines, indexes, and discussion groups on topics including culture, ethnicities, art, music, science, astronomy, architecture, mathematics, military science, women, medicine, religion, and economics.¹⁶ The University of Heidelberg maintains a site (much of which is in English) called the Digital Archive for Chinese Studies, which similarly provides information on a range of online materials.¹⁷ As the Web opens up to more countries, it seems likely that global studies will be facilitated by the accessibility of information to scholars wherever they live (censorship within countries like China is another issue).

GATEWAYS TO THE WORLD WIDE WEB

Digitizing personal papers for conducting biographical research is an obvious project for historians who traditionally rely on individual histories as bedrock for their research. However, the dynamic nature of Web sites allows for more creative ways of searching for, conveying, and classifying information. Web-based resources are making their way into the curriculum—where readings can be accessed, discussion groups maintained, and multimedia animation, movies, and high-resolution pictures used as part of course content. One notable resource is the Internet History Sourcebooks Project, hosted by Fordham University and edited by Paul Halsall of the University of North Florida with the help of a number of contributing editors.¹⁸ This makes available collections of public domain and copy-permitted historical texts. It comprises three main chronologically ordered Web sites—on ancient, medieval, and modern history—and a number of subsidiary themed pages, with one emphasizing history of science.

The amount of online material is increasing exponentially, affording unprecedented opportunities to research and enhance teaching resources. This expansion also creates new, but widely acknowledged, risks of falling prey to misleading or simply incorrect information. While Google searches will lead to thousands of sites on any topic, a number of sites act as more controlled gateways to online resources. ECHO—“exploring and collecting *history online*”—is one gateway that concentrates on science, technology, and industry.¹⁹ MedHist, a gateway designed by the Wellcome Library, provides a guide to history of medicine resources on the Internet. Since 2002, the Committee on Education of the History of Science Society has been involved in reconstructing part of the HSS Web site to provide a portal to specially vetted sites considered to be of particular scholarly merit. Broken links and the hassle of dealing with cumbersome “http://” addresses will remain an issue in maintaining and referencing online resources; but with better collaboration between institutions in control of major resources and increasingly sophisticated tools to check the technical integrity of Web sites, these concerns will likely disappear over time. It will remain in the interest of colleagues in our discipline to further the conversation about the opportunities available for research and teaching online.

¹⁶ <http://saturn.ihp.sinica.edu.tw/~liutk/shih/>.

¹⁷ <http://www.sino.uni-heidelberg.de/dachs/>.

¹⁸ <http://www.fordham.edu/halsall/>.

¹⁹ <http://echo.gmu.edu/index.php>; this is not to be confused with another “ECHO”—European Cultural Heritage Online—which also provides much information on the history of mechanics, life sciences, physics, and other areas of interest to the history of science community.