

Scientific Research: The Publication Dilemma

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Abstract

The article presents a concise overview of key concepts and current issues that are useful in understanding the open access movement.

Introduction

Scholarly communication is an essential part of the scientific research process. Not only do scientists want to disseminate the results of their work to the public and their peers but they also need to ensure that their research findings are original. While the highlights of scientific discoveries are often described in mass media, the details of the research studies are largely reported through journal articles, which make up the bulk of scholarly publishing.

Under the prevailing subscription-based system, commercial publishers own a monopoly over the distribution of scientific research. They charge authors for the publication of their works, then charge the readers subscription, advertising, and online access fees; in addition they retain the copyright of the articles they publish. Consequently, though the vast majority of the scientific research is publicly financed by taxpayers' dollars, access to research is not freely and publicly available: it is restricted to customers who can afford to pay for subscriptions.

In the past few years, the escalating cost of journals has forced many individuals and institutions to cancel their subscriptions, thus excluding large parts of the scientific community from scholarly interaction especially in the developing countries. Until recently, many publishers and researchers believed that there was no better way to disseminate research findings; but in the late 1990s a few organizations began offering the alternatives to traditional subscription-based standards, launching the idea of a new publishing model -- Open Access.

Open Access: What Is It?

According to the [Association of Research Libraries](#), open access is "an alternative to the traditional subscription-based publishing model made possible by new digital technologies and networked communications" ([Association of Research Libraries 2004](#)). Open access means that full-text scientific papers are available online as soon as they are published, free of charge and most restrictions on access or use.

Though a number of pioneering open access initiatives took place as early as the mid 1960s, the open access movement gained momentum only in the late 1990s. It developed primarily in the biomedical sciences as a response to increasing journal costs, which priced many individual and institutional subscribers out of access to the latest research studies. The philosophy of open access is based on the concept that research findings, particularly in health sciences, should be freely and immediately available to the worldwide scientific community, clinicians, and the public.

"Timely access to a broad range of current scientific publications is a necessity...for both our clinicians, so that they may care for patients with the most up-to-date data, as well as our scientists who are making the breakthroughs in such areas as cancer, infectious, cardiovascular and neurological diseases," said Dr. Dorothy Bainton, vice chancellor of academic affairs at University of California at San Francisco ([Davidson 2003](#)).

Open Access Publishing Model: How Does It Work?

While open access journals are intended to be free for users, they are not free for publishers. The costs of producing an open access journal include managing peer review and editorial control, providing high quality online access and technical support. How do open access publishers recover these costs?

They challenge the traditional subscription-based publishing model by offering an alternative -- an article processing fee. Instead of charging subscribers, the open access publishers cover the costs by charging authors, or research sponsors, for each article they publish (for example, the Public Library of Science initially charges authors a processing fee of \$1,500 per accepted article). The additional money comes from institutional membership fees, grants, donations, some advertising, and additional subscription-based products such as BioMed Central's images.MD and Faculty of 1000.

Open Access Leaders

There are two initiatives that are in the center of the open access movement: [BioMed Central](#) and the [Public Library of Science](#).

BioMed Central (BMC), a UK-based publishing house, provides immediate and open access to the full text of research articles published in its 100+ online journals covering all areas of biology and medicine. The BMC's commitment to open access, as stated on the BMC's web site, is based on the premise that "open access to research is central to rapid and efficient progress in science and that subscription-based access to research is hindering rather than helping scientific communication" ([BioMed Central 2005](#)).

Following the lead of BMC in the open access movement, the Public Library of Science (PLOS), a California non-profit group of bioscientists formed in 2000, publishes two online peer-reviewed journals - *PLOS Biology* and *PLOS Medicine* -- funded by a \$9 million grant from the Gordon and Betty Moore Foundation.

The first issue of *PLOS Biology*, published on October 13, 2003, has been a success and received more than half million hits throughout the world within a few hours after publication. In these issue, Duke University researchers Miguel Nicolelis and Jose Carmena, publicized their research findings about how they had trained monkeys with brain implants to move a robot arm with their thoughts, a discovery which might one day allow paraplegics to perform similar functions. "Nothing else has ever argued so strongly for open-access publishing," said Michael Eisen, a co-founder of PLOS ([Eisen 2003](#)).

On March 8, 2005, PLOS has announced the launch of three new journals: *PLOS Computational Biology*, *PLOS Genetics*, and *PLOS Pathogens* that will focus on significant advances and discoveries in the life sciences and medicine. The founders of PLOS, Michael Eisen, a biologist at Lawrence Berkeley National Laboratory, a Nobel laureate, Harold Varmus, and Patrick Brown, a biochemist at Stanford University, stated that their "intention is to do something that fundamentally changes the way scientific research is communicated" ([Eisen 2003](#)). If open access succeeds, they continued, "everyone with an Internet connection will be a click away from a comprehensive online public library of scientific and medical knowledge" ([Eisen 2003](#)).

Once published in BMC and PLOS journals all articles are indexed in PubMed, and, where appropriate, in BIOSIS, ISI, and other databases. The articles are also archived in [PubMed Central](#), and deposited in CrossRef. Because of an effective online system

for submission, peer reviewing, and publication, all research papers become rapidly available for a worldwide audience.

Another open access initiative deserves special attention. PubMed Central (PMC), a digital repository at the [National Institutes of Health](#) (NIH), provides access to the full text of peer-reviewed articles in life sciences, though sometimes on a delayed basis. The recent [Public Access Policy](#) issued by the NIH on April 29, 2005, "requests and strongly encourages all NIH-funded investigators" to deposit a digital copy of the research article in PMC within 12 months of publication ([National Institutes of Health 2005](#)). The date of public release of the free online edition of an article is determined by the author. The NIH started accepting publications based on NIH-funded research for public release through PMC on May 2, 2005.

Open Access and Copyright Issues

In June 2003, Martin Sabo, a Minnesota congressman, introduced a bill, entitled the [Public Access to Science Act](#). The bill addresses several contemporary controversies in scientific publishing including copyright to published research material.

According to Sabo's bill, the works resulting from scientific research substantially funded by the government, would be excluded from copyright protection and become public domain. Since scientific research is largely funded by tax dollars, Sabo said, the results of research should be freely and immediately available to taxpayers who ultimately pay for conducting research.

Sabo's bill poses a direct challenge to large commercial publishers. Under the established system, most scientific journals own the copyrights to research papers they publish. Authors traditionally assign copyright to the publisher, which means that they cannot freely distribute their works or allow open access to them.

Under Sabo's bill, journals would not own the papers they publish. Contrary to commercial publishers, open access literature is free of most copyright and licensing restrictions. Authors own the copyright to their articles according to the terms of the [Creative Commons Attribution License](#). Open access journals leave it up to authors to decide whether they wish to retain the copyright or transfer it to the author's institution or to the open access publisher. But no matter who owns the copyright, states the PLoS's FAQ, "authors are required to license the articles according to the terms of the Creative Commons Attribution License, which allows anyone to download, reuse, reprint, redistribute, or copy them, so long as the original authors and source are credited" ([Public Library of Science 2005](#)).

Unlike the Sabo Bill, the recent NIH's Public Access Policy does not affect the copyright law. Initially the copyright belongs to the author of an NIH-funded research article. Then copyright is transferred to a journal, in which the article is published.

The Future of Open Access

Though some publishers are sympathetic to open access initiatives, only a few of them are willing to experiment with a new business model. In 2004, [Springer](#), a publisher of 1,250 scientific journals, took a step toward open access by offering its authors the {[Springer Open Choice](#)} model. Open Choice allows authors to pay a fee of \$3,000 to have their articles freely available to the readers through Springerlink, Springer's online platform.

Oxford Journals, a division of [Oxford University Press](#) (OUP), has announced a similar open access initiative, {[Oxford Open](#)}: an optional author-pays model to authors of accepted papers in participating Oxford Journals titles. Oxford Open is a further development of the current OUP's open access projects, including {[Nucleic Acids Research](#)} (NAR). NAR, one of the most important OUP journals, which adopted a full open access publishing model in January 2005. "Open Access is the future of scientific publication and one that we should all work hard to make successful," said Richard Roberts, a Nobel laureate, Senior Editor for NAR ([Weitzman 2004](#)).

Many open access advocates consider the traditional commercial publishing system obsolete and believe that the future of scholarly publishing belongs to open access. Yet, skeptics wonder whether open access journals will survive financially in the long term, since they charge relatively small article processing fees, paid up front by researchers, instead of substantial fees for subscriptions. "...to attempt to legislate the demise of the time-honored subscription-based business model, prior to proving that another model works, does not seem wise," stated Michael Held, the Executive Director of the Rockefeller University Press ([Held 2003](#)).

Whether open access publishers will succeed largely depends on whether their journals can build the prestige and encourage scientists to publish their research papers in an unproven journal instead of a traditional one. Gerry Rubin, a prominent geneticist at the Howard Hughes Medical Institute (HHMI), says that though the HHMI encourages its researchers to publish in open access journals "they are not yet ready to make open access an obligation, partly because there are not yet enough high quality Open Access journals" ([Rubin 2003](#)).

Libraries and Open Access

While open access advocates and their opponents are waiting to see how the new publishing model develops, academic libraries are struggling to fulfill their primary mission during the "serials crisis" - to provide access to information. On one side, open access certainly benefits academic libraries with limited budgets, which have been forced to cancel some of the expensive science journals. On the other side, libraries are unlikely to drop the most important subscriptions because of the value and utility of traditional scientific journals.

As seen from the viewpoint of a life science librarian, it now becomes increasingly important that librarians and faculty work cooperatively on building a balanced science collection. Collaborative collection development is one of the most effective ways to create positive change in scholarly communication because both professionals -- a scientist and information specialist - bring to their partnership the unique competencies, skills, and knowledge. Academic librarians play a critical role in facilitating scientific research and can further contribute to this process by keeping researchers well informed about publishing alternatives such as publishing in open access journals and by including open access publications in libraries' informational materials.

George Mason University (GMU) Libraries utilize their {Open Access @ MASON} web site as well as the Libraries' newsletters to promote the open access concept. The Libraries' support for the open access model continues to grow with the implementation of a new program {[MARS](#)} (Mason Archival Repository Service), a digital archiving system and an institutional repository.

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