

Viewpoint ■

Biomedical Publishing and the Internet:

Evolution or Revolution?

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Abstract The Internet is challenging traditional publishing patterns. In the biomedical domain, medical journals are providing more and more content online, both free and for a fee. Beyond this, however, a number of commentators believe that traditional notions of copyright and intellectual property ownership are no longer suited to the information age and that ownership of copyright to research reports should be and will be wrested from publishers and returned to authors. In this paper, it is argued that, although the Internet will indeed profoundly affect the distribution of biomedical research results, the biomedical publishing industry is too intertwined with the research establishment and too powerful to fall prey to such a copyright revolution.

■ *J Am Med Inform Assoc.* 2000;7:230–233.

The Internet, which allows anyone with access to a computer to become a global publisher, is challenging traditional publishing patterns. In the biomedical domain, medical journals are scrambling to make use of the Internet as more and more health-related information goes on line. Beyond this, a number of commentators argue that the basic model of scientific publishing needs drastic revision, that traditional notions of copyright and intellectual property ownership are no longer suited to the information age, and that, in the domain of biomedical publishing, property rights should belong to authors, not to publishers.^{1–3} However, these commentators fail to take into account the central role of biomedical publishing in the power structure of medicine. Although the Internet will indeed profoundly affect the distribution of biomedical research results, the basic copyright structure is likely to remain unchanged, at least in the near future, because the biomedical publishing industry is too intertwined with the research establishment and too powerful to fall prey to a copyright revolution. The evolution of the National Institutes of Health's E-biomed proposal is a prime example of the ability of bio-

medical publishers to block a serious challenge to their authority.

Intellectual Property Rights and the Internet

The Internet has been in existence for more than 30 years, but only since the introduction of the World Wide Web has it become a communication medium on the scale of the printed word, the telephone, radio, or television. The Web allows not only the high-speed transmission of large amounts of information between any two points but also the broadcasting of data to a global audience from any single point on the network. This unique ability of any network participant to become a publisher is one of the most important messages of this medium, and one that poses a major challenge to traditional publishing.

Although it is too early to determine the ultimate effect of the Internet on the ownership, distribution, and financing of information, certain basic trends are beginning to emerge. In a visionary article for *Wired* magazine,⁴ written in the early days of the Web, information expert Esther Dyson wrote:

We are entering a new economic environment . . . where a new set of physical rules will govern what intellectual property means, how opportunities are created from it, who prospers, and who loses. . . . Intellectual property . . . will be copied so easily and efficiently that much of it will be distributed for free in order to attract attention or create desire for follow-up services that can be charged for.

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Received for publication: 8/18/99; accepted for publication: 12/28/99.

In other words, given the ease with which anyone can copy and distribute information on the Internet, and given the vast amount of information that is easily accessible without cost, it will become harder to make money by simply holding the copyright to information and selling access to it at a profit, since people are unlikely to be willing to pay for information they can obtain at no cost online. On the other hand, online access to information will allow copyright holders to develop new sources of income, through marketing that is highly targeted to the viewing audience and the sales of services that are linked to the information sought by the viewer. A prime example of this "devaluation of content" is the recent announcement that the entire *Encyclopedia Britannica* is to be made available to the public via the Web, a move that would have been unthinkable only a few years ago.

Dyson's prediction of the ascendancy of service over bare content is also coming true in the biomedical information space. Many biomedical journals are now making the full texts of some of their articles available on line to the general public. The *British Medical Journal* is available on the Web in its entirety, for anyone to view. Certainly, the prospects are for ever-increasing amounts of biomedical information to be available free on the Internet. How can biomedical journals survive if they offer their material free? In accordance with Dyson's theory, they might provide additional services to their subscribers, over and above the content of articles that are publicly available. For example, they could provide subscribers with links to more information than is included in the standard "journal"; they could make articles available to their subscribers a month or two before "open" publication; and they might reap higher advertising income by providing advertisers with a more specifically targeted audience.

It is important to understand that this development, the devaluation of bare "content" in favor of information services, does not require any alteration in the basics of copyright law. In fact, traditional copyright protections are necessary to allow the selective giveaway of some content while other content-related services are sold. Thus, although the *British Medical Journal* allows free access to its publication, it retains copyright to the material. The publishers can control how users access articles and can, if they desire, display advertisements or other messages to all who visit the Web site. Allowing free access does not require giving up possession (just as museums the world over allow visitors to view their artworks, often for free, while retaining the rights to reproductions of works in their possession).

Although the Internet can drastically alter the flow of information without challenging traditional notions of copyright and intellectual property rights, some argue that, at least in the domain of scholarly publishing, the Internet will, in fact, drastically change the ownership of intellectual efforts.¹ These voices have become particularly loud in the biomedical domain.^{2,3} In this issue of JAMIA, Markovitz⁵ provides a detailed and persuasive summary of these arguments.

Biomedical Publishing: The Argument for a Paradigm Shift

The line of reasoning presented by Markovitz has been advanced by a number of authors, most notably Stevan Harnad, a professor of cognitive psychology who has written prolifically on the topic.⁶⁻⁹ The basic points of this argument are as follows:

- Scholarly publishing is different from trade publishing. In trade publishing, authors assign copyright to publishers, who then sell copies of the authors' work and share profits with them. Both the authors and the publishers are interested in limiting consumers of the published work to those who have paid for it.

The reporting of biomedical research results, like other forms of scholarly publishing, is different from trade publishing in that the authors do not sell their work, do not participate in profits when it is sold, and are interested in the widest possible distribution of their work rather than its restriction to a paying audience.

- The reason authors of medical research are forced to assign copyright to biomedical publishers is that, at least until now, they had no other means of distributing their work. Giving up ownership of their intellectual property rights to publishers in return for distribution is what Harnad refers to as the "Faustian bargain"—giving up one's soul (work) in return for immortality (being published).⁹

With the rise of the Internet and the ability to self-publish, scientific authors should no longer be forced to give away their copyright to gain distribution. They should be able to distribute their work free, on the Internet, both before and after acceptance by traditional journals. Although journals are no longer necessary for the distribution of scientific work, their role in quality control remains paramount, and they are still needed to perform the function of peer review.⁸

It should be noted that this proposal would challenge not only journals' ownership of copyright but also, by

encouraging the online publishing of research results before they have been accepted by peer-reviewed journals, the Ingelfinger rule. The Ingelfinger rule, first promulgated by an editor of the *New England Journal of Medicine*, states that a journal will not publish a report if it has already been submitted for publication elsewhere, and is yet another means by which journals exercise control over authors.^{10,11}

Will the Paradigm be Shifted?

How likely is it that the world's biomedical journal literature will become free for all to download and copy at will, while journals persist as the primary mechanism for peer-review and are financed directly by authors and sponsoring institutions? Not very likely, in my opinion, because this analysis fails to take into account the central position of biomedical journals in the overall structure of medical research.

Biomedical research contributes directly or indirectly to much of the cost of health care, itself a sizable segment of our economy. The two principal producers of medical research are academic medicine and the biomedical industries, while the public supports research through generous financial grants. These processes are highly dependent on the medical journal literature.

Academic medicine is an intensely competitive and hierarchic structure. Promotion is dependent on publication in the journal literature. Furthermore, the editorial boards of major journals are composed of many of the most prominent academics, promoting the interdependence of academia and biomedical publishing. Similarly, the biotechnology and pharmaceutical industries depend on favorable coverage in the literature for the success of their products, and advertising in this literature is a significant part of their efforts. Finally, the medical literature is the major source of information about research developments for both the lay press and the government, and thus greatly influences how public funds are spent. The entire structure of biomedical research, including academia, the biotechnology industries, and public funding, can be viewed as a highly complex system in which the essential function of coordination, the nervous system as it were, is assured by the biomedical journal publishing industry.

It is this central position of biomedical publishers in the power structure of medicine that gives them the ability to block any serious threat to their ownership of copyright. Journals are able to force authors to cede copyright by making this a condition of publication, and publication is essential to career advancement. It will be a long time before an author whose work

could be published in the *New England Journal of Medicine* will risk its rejection by subversively archiving it on the Internet.

Besides authors, another powerful group that could conceivably challenge the hegemony of biomedical publishers is the academic libraries, whose budgets are being strained by traditional journal subscription fees in addition to new expenses for online services. Libraries are not in a position to boycott publishers, however, given the need of researchers for access to information. Furthermore, the cost for access to the biomedical literature is probably nearing a peak. The additional expense of online access to journals has not yet been offset by a decrease in the amount of money that libraries spend on print journals, but this will surely happen in the near future, and the cost crunch faced by libraries should then begin to ease.

Academic medicine, the biotechnology industries, and government funding agencies all make ample use of the power of the biomedical press and all have a stake in the perpetuation of the status quo. Even if some of the coordination of biomedical research could be carried out by journals that were stripped of their copyright but not their peer-review functions, the transition to such a system would be such a disruption, such a dislocation of existing alliances, that resistance to it would be fierce. The fate of the PubMed Central project of the National Institutes of Health (NIH) is highly illustrative of the ability of biomedical publishers to respond to a challenge to their authority.

In May 1999, the NIH, under the direction of Harold Varmus, proposed a system for the dissemination of biomedical research, dubbed E-biomed, that was remarkably similar to the proposals floated by Harnad and others.¹² It was to be a two-component repository of medical research reports, one component containing articles peer-reviewed by medical journals and one component containing the equivalent of research preprints. Articles from this second, general repository would be critiqued and revised on line, and could then be submitted to the editorial boards of journals. When accepted, these articles would become regular journal articles but would remain accessible via the Internet at no charge.

Not surprisingly, this proposal engendered vigorous debate in the biomedical and general press. Because E-biomed was initiated under the auspices of the NIH, it had to be taken seriously, and it was. Most of the major biomedical journals issued comments on the project, and most were predictably mixed or negative.¹³

How did E-biomed fare? In the initial proposal, published on the NIH's Web site,¹² it was stated that

"copyright to reports posted in E-biomed would be retained by the authors, with the provision that intact versions would be freely available for transmission, downloading, and publication." After vigorous debate in the press and in the medical literature, an addendum to the original E-biomed proposal was published less than two months later,¹² which clarified a number of topics but also dealt with copyright and included the following sentence: "Although we favor the notion that authors will retain copyright, this is a matter that could largely be left to individual editorial boards to resolve." On Aug 30, 1999, the NIH announced that the E-biomed project was being restructured and renamed PubMed Central. As for copyright, "scientific publishers, professional societies, and other groups independent of the NIH will have complete responsibility for the input to PubMed Central. Copyright will reside with the submitting groups (i.e., the publishers, societies, or editorial boards) or the authors themselves, as determined by the participants." This is tantamount to leaving the copyright status unchanged.

The fact that the prestigious NIH was unable to wrest significant copyright concessions from the biomedical publishing industry is a telling comment and makes it unlikely that other efforts to do so will be successful, at least in the near future.

Where to from Here?

Clearly, biomedical publishing will continue to be challenged by the Internet. In accord with Dyson's predictions and with developments in other sectors of society and the Internet, more and more information will be available on line, at little or no cost. Biomedical journals will provide more of their content free or for reduced fees, and they will cooperate with projects to facilitate access to research results (such as PubMed Central). Journals will provide links to other repositories of data, and there will be interactive feedback from readers and researchers. The flow of information will indeed be enhanced and liberated, and the cost to consumers, researchers, and libraries for access to information will drop substantially.

But there will be no copyright revolution. Authors will continue to give up intellectual property rights in return for publication in the peer-reviewed literature, and the power of the biomedical publishing industry

will continue undiminished, at least for now. Although the arguments against freeing the journal literature will be couched in terms of the need to preserve peer review and quality, the reality is that the biomedical press is too powerful and too integral a part of the research industry to have its foundations threatened by well-meaning scientists.

References ■

1. Bachrach S, Berry S, Blume M, et al. Who should own scientific papers? *Science*. 1998;281:1459-60. Also available at: <http://www.sciencemag.org/cgi/content/full/281/5382/1459>. Accessed Aug 16 1999.
2. LaPorte RE, Marler E, Akazawa S, et al. The death of biomedical journals. *BMJ*. 1995;314:387-90.
3. Walker TJ. Free Internet access to traditional journals. *Am Sci*. 1998;86(5). Also available at: <http://www.amsci.org/amsci/articles/98articles/walker.html>. Accessed Aug 16, 1999.
4. Dyson E. Intellectual value. *Wired*. Jul 1995:136ff.
5. Markovitz B. Biomedicine's electronic publishing paradigm shift: copyright policy and PubMed Central. *J Am Med Inform Assoc*. 2000;7:222-9.
6. Harnad S, Hemus M. All or none: no stable hybrid or half-way solutions for launching the learned periodical literature into the post-Gutenberg galaxy. In: Butterworth I (ed). *The Impact of Electronic Publishing on the Academic Community*. London, UK: Portland Press, 1997:18-27. Available at: <http://www.cogsci.soton.ac.uk/~harnad/Papers/Harnad/harnad97.hybrid.pub.html>. Accessed Aug 16, 1999.
7. Harnad S. Universal FTP archives for esoteric science and scholarship: a subversive proposal. In: Okerson A, O'Donnell J (eds). *Scholarly Journals at the Crossroads: A Subversive Proposal for Electronic Publishing*. Washington, DC: Association of Research Libraries, 1995.
8. Harnad S. Implementing peer review on the net: scientific quality control in scholarly electronic journals. In: Peek R, Newby G (eds). *Scholarly Publishing: The Electronic Frontier*. Cambridge, Mass: MIT Press, 1996:103-18. Also available at: <http://www.cogsci.soton.ac.uk/~harnad/Papers/Harnad/harnad96.peer.review.html>. Accessed Aug 16, 1999.
9. Harnad S. The post-Gutenberg galaxy: how to get there from here. *Inf Soc*. 1995;11:285-92. Also available at: <http://www.cogsci.soton.ac.uk/~harnad/THES/thes.html>. Accessed Aug 16, 1999.
10. Altman LK. The Ingelfinger rule, embargoes, and journal peer review, part 1. *Lancet*. 1996;347:1382-6.
11. Altman LK. The Ingelfinger rule, embargoes, and journal peer review, part 2. *Lancet*. 1996;347:1459-63.
12. Varmus H. E-biomed: a proposal for electronic publication in the biomedical sciences. May 5, 1999; addendum Jun 20, 1999. National Institutes of Health Web site. Available at: <http://www.nih.gov/welcome/director/ebiomed/ebi.htm>. Accessed Aug 16, 1999.
13. Relman A. The NIH "E-biomed" proposal: a potential threat to the evaluation and orderly dissemination of new clinical studies. *N Engl J Med*. 1999;340:1828-9.