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About me: I am an associate professor of Molecular and Cell Biology at the University of California, Berkeley and an Investigator of the Howard Hughes Medical Institute. I am also a co-founder and member of the board of directors of the Public Library of Science, a San Francisco based non-profit publisher of open access scientific journals.

I am responding to your request for information on how to best provide public access to publications describing the results of scientific and medical research funded by the US government. My views on this topic are begin with a simple principle:

If the taxpayers paid for it, the taxpayers own it.

In particular, when the taxpayers pay to generate information, by default that information should be in the public domain. The only exception should be if it is unambiguously in the public interest to restricting access in some way. For example:

- taxpayers pay to generate classified military intelligence, but do not have access to it in order to protect public safety
- taxpayers pay to collect information filed with income tax returns, but that information is not publicly available to protect individual's privacy

However, the scientific and medical research literature is different. Its value to the public is maximized when it is as widely available as possible. Research is a cumulative endeavor whose progress depends upon the flow of ideas, methods, data and discoveries. And there are countless people outside of the research community who benefit directly from access to the latest scientific and medical discoveries, including physicians and their patients, teachers and their students, and any member of the public interested in seeing where their tax dollars go.

Today, virtually all scientific and medical journals disseminate their results electronically (the number of journals that still print is dwindling, as is the number who read printed copies of these journals). The only reasons that the published results of all government funded scientific research is not freely available online at the moment they are published are 1) that most publishers of biomedical research journals cling to an economic model developed in the 17<sup>th</sup> century that depends upon granting access only to paying readers, and 2) that the government has been unwilling to defend the taxpayers fundamental right to access this material.

Prior to the internet, when information was primarily transmitted in printed form, the public good was advanced by an effective collaboration between the public research community, who generated information at taxpayer expense, and publishers, who curated, printed and distributed journals around the world. To facilitate the journals' role in the process, it became standard practice for researchers to assign their copyright in the work to the publishers. Because every copy of a printed journal costs money to print and distribute, it made sense for publishers to charge for every copy they delivered. Of course not everybody could have access to every journal whenever they wanted. But this was a limit of the technology available at the time.

But these limitations evaporated in the 1990s when the internet replaced printed journals as the primary mode of distribution for most scientific journals. There is now no technological obstacle to providing anyone with an internet connection access to the latest scientific and medical discoveries. And the fundamental economics changed as well. The costs of electronic publishing almost entirely come in production of the final version of the paper – there is essentially no marginal cost when a new reader accesses an article. Thus, while it once made economic sense to charge readers, it now no longer does. Unfortunately, publishers have largely failed to seize the opportunity provided by this technological revolution. Most publishers of research journals still charge individual readers and institutions to access their content, and deny access to all others.

This denial of access for most Americans to the results of biomedical research they paid for is completely unnecessary. In the past decade entrepreneurs in the US and elsewhere have seized on the remarkable advances in electronic communication to create a new business model that funds the value added by journals (overseeing peer review, editing and formatting of electronic documents) with requiring the massive subtracted value of denying millions of Americans access to something they paid for.

This new business model – known as open access publishing – treats the activities carried out by scientific publishers as a service provided to the research community and its funders. Open access journals are paid for the service they provide, and the peer-reviewed and edited papers they produce are made freely available from the moment of publication. Although initially dismissed as naïve, open access journals are now thriving. The Public Library of Science (PLOS) – a San Francisco based non-profit publishers that I co-founded along with Patrick Brown and Harold Varmus – now publishes the largest journal in the world, with over 14,000 papers published in the last year. And the organization is thriving financially. BioMed Central, a UK based for-profit open access publisher was acquired by a large commercial publisher (Springer) after it achieved profitability.

The success of open access provides an obvious means for the government to achieve universal taxpayer access to the research it funds. I would like to propose that the government make it a condition of the receipt of federal funds for scientific

research that any papers derived from their work be made immediately freely available through the National Library of Medicine. Researchers would have a wide choice of open access publishers to choose for publishing their papers, and existing non open access journals would have the opportunity to shift to the open access model or risk the loss of papers from federally funded scientists.

[I would like to emphasize at this point that I have no financial interest in the success of PLoS, which is a non-profit, or any other open access publisher].

Some publishers are sure to argue that this would constitute an intrusion of the government into the free market. But this is not the case. Publishers would, in fact, not be party to such a policy. In requiring that its grantees make the work available to the public, the government would be continuing a long tradition of imposing conditions on the receipt of federal funds. This would undeniably alter the marketplace for the provision of publishing services to the research community. But markets change all the time, and the free market will do here what it always does, and adapt to the new market conditions.

In considering such an action, I would point to several precedents in federal law. First, as you are undoubtedly aware, the Copyright Act of 1976 expressly precludes copyright protection to works produced by the federal government and its employees. Thus, for example, papers published by NIH intramural investigators are not subject to copyright, and are thus freely available to the public. Although the law did not apply this exemption from copyright to works funded by the federal government but not carried out by government employees, Congress carefully considered the matter, and wrote the following in the report language accompanying the bill:

**Copyright Law Revision (House Report No. 94-1476)**

A more difficult and far-reaching problem is whether the definition should be broadened to prohibit copyright in works prepared under U.S. Government contract or grant. As the bill is written, the Government agency concerned could determine in each case whether to allow an independent contractor or grantee to secure copyright in works prepared in whole or in part with the use of Government funds. The argument that has been made against allowing copyright in this situation is that the public should not be required to pay a "double subsidy," and that it is inconsistent to prohibit copyright in works by Government employees while permitting private copyrights in a growing body of works created by persons who are paid with Government funds. Those arguing in favor of potential copyright protection have stressed the importance of copyright as an incentive to creation and dissemination in this situation, and the basically different policy considerations applicable to works written by Government employees and those applicable to works prepared by

private organizations with the use of Federal funds....Where, under the particular circumstances, Congress or the agency involved finds that the need to have a work freely available outweighs the need of the private author to secure copyright, the problem can be dealt with by specific legislation, agency regulations, or contractual restrictions.

The scenario envisioned in 1976 – “the need to have a work freely available outweighs the need of the private author to secure copyright “ - surely applies now.

Finally, I find the following metaphor useful in thinking about the absurdities of the current publishing system: Consider the process of bringing a new baby into the world. Few would dispute that obstetricians play a significant role in the healthy delivery of a newborn baby. In exchange for their service they provide, they could demand ownership of the baby, and charge the parents a monthly fee to access their child. After all, the doctor “added value” to the baby by ensuring that the birthing process went well, and they deserve to be compensated for it.

Of course everybody recognizes this is absurd, because, while the doctor did do something of value, their contributions were trivial in comparison to those of the mother who carried the child for 9 months and did far, far more work during the actual delivery. But it is precisely this logic that leads publishers to assert the right to control permanently and restrict access to the primary record of publicly funded scientific and medical research.

Some additional references:

“Research Bought, Then Paid For”, an OpEd I wrote on this issue in the New York Times

<http://www.nytimes.com/2012/01/11/opinion/research-bought-then-paid-for.html>

“Why PLoS Became a Publisher”, an essay written by myself and the two co-founders of PLoS explaining open access.

<http://www.plosbiology.org/article/info:doi/10.1371/journal.pbio.0000036>