SPECIAL ARTICLE

Predatory Publishing, Questionable Peer Review, and Fraudulent Conferences

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Open-access is a model for publishing scholarly, peer-reviewed journals on the Internet that relies on sources of funding other than subscription fees. Some publishers and editors have exploited the author-pays model of open-access, publishing for their own profit. Submissions are encouraged through widely distributed e-mails on behalf of a growing number of journals that may accept many or all submissions and subject them to little, if any, peer review or editorial oversight. Bogus conference invitations are distributed in a similar fashion. The results of these less than ethical practices might include loss of faculty member time and money, inappropriate article inclusions in curriculum vitae, and costs to the college or funding source.

Keywords: peer review, open access, scientific publishing, scientific conferences

INTRODUCTION

The advent of the Internet age and digitization of data resulted in many changes, one of which was the concept of peer-reviewed, open-access (OA) publishing with free availability to anyone with Internet services. This transition increased when the National Institutes of Health (NIH) began requiring that any manuscript resulting from its funding be made publicly available via PubMed. The number of high-quality scientific research manuscripts published via OA continues to increase. Unfortunately, there has also been an increase in attempts to exploit the OA concept for profit by requiring authors to pay for publication up front and performing none of the peer review advertised. These groups market their “services” through e-mails to scientists and faculty members, offering recipients the opportunity to publish articles in a new online peer-reviewed journal, to serve as a reviewer or editor of a new journal, or to speak or host a roundtable discussion at a conference, which may be described as “global” or “international.” The objective of this article is to describe some of these practices and ways to avoid them.

DEVELOPMENT OF OPEN ACCESS PUBLISHING

The publishing paradigm has changed from print-only subscriptions to digitally available and free scientific

publications. *Nature* was first published in 1869, *Science* in 1880, and subsequently scientific journal publishing has increased to the point of a new paper being published every 20 seconds.¹ In 2000, the future of scientific publishing was changed by the debut of PubMed Central and the Public Library of Science (PLOS). The next year, thousands of scientists called for a boycott of journals that would not allow free access on PubMed within 6 months. In 2002, for-profit *Biomed Central* began charging authors \$500 to publish. In 2003, *PLOS Biology* was launched, charging authors \$1500. By 2006, PLOS initiated the non-profit *PLOS One*, charged a \$2500 author fee, and reviewed articles by placing scientific rigor over importance. In 2008, NIH mandated that papers published as a result of its funding be made free to the public within 12 months, and in 2009, the US Congress permanently required that all funded investigators submit electronic versions of their manuscripts to the National Library of Medicine’s PubMed Central.² By 2010, PLOS generated revenues greater than costs and *PLOS One* became the world’s largest scientific publisher by volume.

Open-access literature is electronic, online, free of charge to any reader, and free of most copyright and licensing restrictions.³ Internet users may freely read, download, copy, distribute, and print literature without restriction. Copyright holders consent to open access using Creative Commons⁴ or other open-content licenses. Publication fees may be charged to the author, particularly for high-impact publications, to defray the costs of online publication. Most frequently, however, the author is sponsored by his employer or through funding.

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The Directory of Open Access Journals (DOAJ) was founded in 2003 and, as of this writing, included 9708 journals and 1 595 160 articles.⁵ The stated aim of the DOAJ is to increase the visibility and ease of use of OA scientific and scholarly journals, thereby promoting their increased usage and impact.

Laakso et al conducted a systematic study of OA publications from 1993 to 2009, which described the growth of the peer-reviewed publishing format and characterized 3 periods: pioneering (1993-1999), innovation (2000-2004), and consolidation (2005-2009).⁶ The authors estimated that during 2010, 191 000 OA articles were published in 4769 journals. The costs of online publishing are different from those of printing and shipping hard-copy journals, requiring new approaches to subsidize the remaining costs of copy editing, web hosting, and effective peer review.

For some journals, adaptation to the changes in scientific publication has been problematic.⁷ A number of professional organization journals contracted with commercial publishing companies resulting in some cases in substantially increased journal costs with which library budgets could not keep pace.⁸ Members of such smaller organizations had to choose to pay the increased dues or to not renew. However, the development of OA eased many of these problems, and an infrastructure was developed for organizations to economically outsource manuscript review, handling, and publication.

In other cases, highly respected peer-reviewed journals such as *Science* and the *Journal of Biologic Chemistry* present their full text online only to subscribers. Others post only the table of contents and abstracts for each issue. Ellis Rubinstein, editor of *Science*, said: "We're still in the earliest stages of having an impact on our readers. If you look at this situation even five years from now, you will see a major impact. . ." on scientific journals' use of the Internet to provide information to readers.⁹

PEER REVIEW

Van Noorden argued that the scientific community carried out peer review for free, yet the publishing companies charged billions of dollars a year for the same persons to read the articles.¹⁰ The average cost to the publisher for an article is thought to be around \$3500-\$4000. Open-access fees are much lower than this, with BioMed Central, and PLoS charging \$1350-\$2250 for many of their journals, although some are as high as \$2900. PeerJ offers to publish an unlimited number of papers per author for a one-time of \$299.

Sabharwal et al noted in a review of 63 orthopedic journals identified via the ISI Web of Knowledge that 38 (60.3%) did not offer any form of OA publishing, and only

5 (8%) published all their content as OA.¹¹ Twenty (31.7%) journals offered authors the choice to publish their article as OA if a publication fee (median \$3000) was paid. The median impact factor was 1.28 for subscription journals and 1.47 for OA publications.

Open-access titles such as the PLoS Medicine and PLoS Biology have impact factors of 15.3 and 12.7 respectively. Some aspiring authors accepted the model of author-pays or author sponsor-pays for OA peer-reviewed publishing. The NIH mandate for taxpayer-funded research to be published in PubMed decreased the grip for-profit publishers had on new knowledge. Libraries benefited from reduced costs for former subscription-only journals and less frequent permission requests for copyright waivers.

Maintaining quality control in peer review depends on rigorous review by both editorial staff and readers.¹² Those who volunteer to peer review manuscripts perform an essential service for which no formal training is available. The quality of peer review may vary among reviewers. A fictitious manuscript concerning a double-blind, placebo-controlled study of intravenous propranolol for acute migraine headache pain was crafted to include errors in order to evaluate peer reviewer performance.¹³ Of 199 reviewers who made recommendations, 15 recommended acceptance, 117 rejection, and 67 revision. Sixty-eight percent of the reviewers failed to recognize that the conclusions of the study were not supported by the results.

The process of peer reviewing scientific manuscripts, unlike the studies that are reviewed, has not been examined in a systematic way in order to define essential peer review mechanisms that can support policy measures.¹⁴ In a study of almost 1500 National Heart, Lung, and Blood Institute-funded cardiovascular R01 grants, Danthi et al analyzed percentile rankings and citation analysis outcomes for publications resulting from the awards.¹⁵ Projects with the lowest priority scores from reviewers received just as many citations and publications as those with the best scores. Although potential impact is one of the main criteria for review of proposals, peer review did not succeed in predicting this outcome. The unfortunate conclusion was that the proposals given the lowest priority got the least or no funding even though their impact as measured by citations, and time to publish was no different from those given high priority and awarded larger grants.

Publication brings clinicians and scientists' ideas to the public and establishes intellectual property rights for the ideas and data presented in the articles. Moreover, a peer-reviewed publication demonstrates that critical scrutiny was applied. Fisher and Powell provide a

commentary on publishing with useful guidelines for both reviewers and authors.¹⁶

Bordage performed a content analysis of reviewer comments on 151 medical education research manuscripts.¹⁷ An average of 4 peers reviewed each manuscript, and reasons they gave for rejecting a paper were assessed, which included inappropriate statistics or instrumentation, small or biased sample, difficult or unclear text, insufficient problem statement, incomplete review of literature, insufficient data presented, and defects in tables or figures.

A useful blog about peer review can be found at a *Nature* website.¹⁸ At *Nature Chemical Biology*, for example, reviewers are given advice based on the idea that they are making important commitments to the authors and the journal. Any potential conflicts or concerns about expertise should be disclosed before agreeing to accept a review request. Reviewers should treat manuscripts as confidential and not distribute or disclose its contents ahead of publication. Reviewers are given a deadline of 2 weeks for the initial review, and should be available to review revised versions of the manuscript, which often include new data. The most useful comments a reviewer can provide will outline arguments for or against publication, and provide authors with specific suggestions as well as a detailed assessment of its technical merit, how the paper fits in with current published research, and the study's potential significance and appeal. A number of other postings on this blog site offer additional advice for reviewers.

PREDATORY PUBLISHING PRACTICES

While the concept of predatory publishing is not new, it may not be widely known in scholarly pharmacy practice and research. Predatory publishing is the practice of publishing journals that exploit the emerging acceptance of open-access academic journals to undermine peer-review processes.¹⁹ Most often, the author pays a publication fee to the publisher, who will purportedly send the manuscript to an editorial staff for peer review. Yet, articles may be accepted without any change. In *Science*, Bohannon revealed that a completely contrived research paper was accepted for publication by more than half of the peer-reviewed journals to which it was submitted.²⁰ Jeffrey Beall, a librarian at the University of Colorado, Denver, called the unscrupulous publishers "predatory," although there may be various degrees of quality subsumed under this pejorative term.¹⁹ He lists such publishers and stand-alone journals on his blog Scholarly Open Access.²¹ Beall commented, "The author-pays model is changing scholarly publishing because authors, rather than libraries or other subscribers, become the publishers' customers, an arrangement that creates a built-in conflict of interest. The more articles a publisher accepts, the more revenue it

earns. New Open Access publishers are appearing almost weekly, and many are engaged in unethical practices."²² To be fair, many highly respected and completely ethical publishers charge author fees. Beall described in detail his review and analysis of open-access publishers and assigned comparative ratings to several characteristics.²¹⁻²³ Beall's concerns are not about open-access *per se*, but about exploitation of the peer-review process and publishing practices.

Not everyone agrees with Beall. In a recent study using the impact factor or number of citations as a proxy for the scientific quality of thousands of subscription and open-access publications from Web of Science and Scopus, Bjork and Solomon concluded that in health and science, open-access journals receive about as many citations as subscription journals.²³ The impact factor receives tacit acceptance as an indicator of scholarly quality for many who plan to publish, search committees who evaluate CVs, and rank and tenure committees who examine faculty member credentials.

The *modus operandi* of predatory publishing generally takes the form of a publisher distributing e-mails asking recipients to submit articles, or to serve on the editorial board or even as editor of a new publication with a scientific-sounding title. Authors are asked to pay publication costs either before or after submission and are likely nonrefundable. The costs may be relatively low to entice unsuspecting scholars. Karen Coyle, also a librarian, likened such "cold call" requests to the 1849 US gold rush. She noted "While many hopefuls flock to the gold rush, so do the cheats, charlatans, and scoundrels. Some of these exploit the situation for their own gain; others go further and take advantage of the trust of others. In the rush to print, and the hopes of attaining prestige, unscrupulous authors can place identical or near-identical articles in multiple journals. Where the journals themselves are not providing rigorous peer review and editorial oversight (and, admittedly, some may not be providing any at all), the rules of academic engagement are thus broken."²⁴ Some publishers use titles claiming American or European origin when, in fact, there is no association at all by geography or academics. Coyle posited, "The willingness to put one's name on a journal that is not following best practices in publishing is a moral failure in academe that needs to be addressed at an institutional level. It is not enough to lend your name to the board of a journal, adding to your own CV; such a position should only be taken by those willing to work toward the development of quality scholarly research and publication."

However, much like the advent of unwanted spam, phishing, virus attacks, and hacking in the Internet age, the once-sacrosanct principle of the "international, scientific,

peer-reviewed journal” has now, in many cases, become suspect.²⁵ The issues are not about OA journals *per se*; they are about maintaining quality control in peer review and publishing processes. In 2009, an editor-in-chief resigned from *The Open Information Science Journal* published by Bentham Science Publishing after the publisher accepted a hoax article without his knowledge.²⁶ The authors had submitted a paper that was prepared with software that generates grammatically correct but nonsensical text.

The success of major OA publishers resulted in another deceptive practice called “citation stacking.” One such case was exposed after several Brazilian editors conspired to publish articles containing hundreds of references to papers in each other’s journals in order to elevate the journals’ impact factors.^{27, 28} This practice stems from the notion that important articles are likely to be published in journals with high impact factors. They initially avoided detection by not citing papers published by their own journals, until June 19, 2013, when Thomson Reuters, the firm that publishes the impact factor for scientific journals, revealed the scam.

In a similar fashion, 6 documents authored by a fictitious author were uploaded to an institutional website, each with 129 references including references to all of the publications of a research group at the university.²⁹ As expected, Google Scholar indexed these articles on their domain, and Google Metrics added citations for the authors referenced in the 6 documents. This resulted in 774 additional citations for the 47 members of the research group and 52 journals. Google Scholar and Google Metrics did not detect these false documents and citations. It is not difficult to imagine with the pressure of tenure and promotion that aspiring academics might be persuaded to publish in a journal with questionable aims.

FRAUDULENT CONFERENCES

Predatory publishers obtain e-mail addresses for scientists and faculty members and send requests to publish or serve on editorial boards of new OA journals. *The New York Times* reported that scientists recruited to appear at a conference called Entomology-2013 mistakenly believed they were to make a presentation to the leading professional association of entomologists.³⁰ In fact, the prestigious conference was named Entomology 2013 (without the hyphen). The speakers for the fraudulent conference were recruited by e-mail and later charged a fee for the privilege. Most of those who paid the registration fee were offered the opportunity to make a presentation that could be used for résumé purposes if they chose to do so. Fraudulent conferences take advantage of scholars for reasons similar to electronic publication: profitability for the hosting “organization” and the desire

for recognition by the party invited to make a presentation or chair a round table discussion.

There is now a blog for bogus conferences.³¹ Both Beall’s blog and *The Chronicle of Higher Education* warn readers about bogus conferences that may use the names of scientists without their permission to invite participants to their meetings, promote their meetings by giving them names that are deceptively similar to other well-established meetings, and refuse to refund registration fees, even if the meetings are cancelled.³² Another website listing bogus conferences is called Con-fereces.³³

DISCUSSION

Misconduct undermines public trust in the validity of peer review and scientific publication, and legitimate publishers and bibliometric analysts are concerned. Authors and reviewers may want to become as informed about this threat to scholarly credibility as publishers and bibliometric analysts are.³⁴ Self-regulation of scientific integrity is accomplished through peer review and publication standards. Guidelines for journal editors have been published by the Committee on Publication Ethics, the International Committee of Medical Journal Editors(ICMJE), the World Association of Medical Editors, the EQUATOR Network (Enhancing the Quality and Transparency of Health Research), the Council of Science Editors, and the Office of Research Integrity, among others.³⁵

Blackwell Publishing stated in its best practice guidelines for publication ethics that sources of funding should always be revealed.³⁴ Journal editors may want to consider adopting the ICMJE authorship criteria, which state that authorship credit should be based on substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, article drafting or critical revising, and final approval of the version to be published. Blackwell includes other suggestions, such as specific instructions regarding redundant publication. Clinical trials should be registered in free clinical trial registries. Authors should state that their study was approved by the relevant research ethics committee or institutional review board, and if animals are used, animal care should be described. Consent should be obtained from study participants for data or photographs.³⁵

Lovejoy et al recognized that while reviewing proposed manuscripts is time-consuming, it can also be intellectually stimulating, and provided guidance for novice as well as seasoned reviewers.³⁶ Several recommendations for novice reviewers bear repeating, such as identifying a small number of areas of expertise, preferably in those in which they have published, and disclosing potential financial biases, disagreement with methodology or content, and recognition that a colleague or other individual close to

the reviewer is the author. Lovejoy also recommended that reviewers read additional literature even though that is normally not expected, that they include a recommendation to publish or not in responses to the journal editor and not to authors, and that comments to authors should be phrased in a respectful tone.

When considering author-pay online publishing and conference invitations from unknown organizations, potential authors may want to assure that the publisher or journal is not on Beall's list, and if it is, read Beall's comments and any responses from the publisher or editor. The same principles can be applied to conferences not associated with familiar organizations. Many OA publishers are new and aim for the highest ethical standards; nonetheless, diligence can be applied to avoid journals where authors pay regardless of ultimate acceptance and to withhold payment until constructive criticism is received from at least 2 reviewers.

Finally, at the institutional level, individuals and committees charged with evaluating the qualifications of candidates in the processes of hiring and promotion may also want to become as informed as possible of the varied quality of peer review in the current environment. People with budgetary oversight should to consider whether publishing fees and conference fees are spent with due diligence when faculty members propose to publish or attend conferences.

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REFERENCES

1. Munroe R. The rise of open access. *Science*. 2013;342(6154):58-9.
2. NIH Public Access Policy Details, National Institutes of Health. <http://publicaccess.nih.gov/policy.htm>. Accessed Jan. 27, 2014.
3. Seber P. Open Access Overview. 2013. <http://legacy.earlham.edu/~peters/fos/overview.htm>. Accessed February 17, 2014.
4. Creative Commons. <http://us.creativecommons.org/> Accessed May 19, 2014.
5. Directory of Open Access Journals. <http://doaj.org/>. Accessed March 28, 2014.
6. Laakso M, Welling P, Bukvova H, Nyman L, Björk B-C, Hedlund T. The development of open access journal publishing from 1993 to 2009. *PLoS ONE*. Vol. 6; 2011:e20961.
7. Odell J, Whipple EC. The Changing Landscape of Scholarly Publishing: Will Radiation Research Survive? *Radiat Res*. 2013;180(4):335-9.
8. Prosser D. Between a rock and a hard place: the big squeeze for small publishers. *Learn Publ*. 2004;17(1):17-22.
9. Lewin DI. Online science journals: a net gain? <http://www.columbia.edu/cu/21stC/issue-3.4/lewin.html>. Accessed March 29, 2014.
10. Van Noorden R. Open access: The true cost of science publishing. *Nature*. 2013;495(7442):426-9.
11. Sabharwal S, Patel N, Johal K. Open access publishing: a study of current practices in orthopaedic research. *Int Orthop*. Jan 3 2014.
12. Grainger D. Peer review as professional responsibility: a quality control system only as good as the participants. *Biomaterials*. 2007;28(34):5199-203.
13. Baxt WG, Waeckerle JF, Berlin JA, Callahan ML. Who Reviews the Reviewers? Feasibility of Using a Fictitious Manuscript to Evaluate Peer Reviewer Performance. *Annals of Emergency Medicine*. 9// 1998;32(3):310-7.
14. Squazzoni F, Gandelli C. Saint Matthew strikes again: An agent-based model of peer review and the scientific community structure. *Journal of Informetrics*. 4// 2012;6(2):265-75.
15. Danthi N, Wu CO, Shi P, Lauer M. Percentile ranking and citation impact of a large cohort of National Heart, Lung, and Blood Institute-funded cardiovascular R01 grants. *Circulation research*. Feb 14 2014;114(4):600-6.
16. Fisher RS, Powers LE. Peer-reviewed publication: a view from inside. *Epilepsia*. 2004;45(8):889-94.
17. Bordage G. Reasons reviewers reject and accept manuscripts: the strengths and weaknesses in medical education reports. *Acad Med*. Sep 2001;76(9):889-96.
18. Peer-to-Peer Blog. *NatureInsight*. <http://blogs.nature.com/peer-to-peer/>. Accessed March 29, 2014.
19. Beall J. Predatory publishers are corrupting open access. *Nature News*. 2012;489:179.
20. Bohannon J. Who's afraid of peer review? *Science*. 2013;342(6154):60-5.
21. Beall J. Scholarly Open Access. <http://scholarlyoa.com>. Accessed February 4, 2014.
22. Beall J. Five Scholarly Open Access Publishers. *The Charleston Advisor*. 2012;13:5-10.
23. Bjork B-C, Solomon, D. Open access versus subscription journals: a comparison of scientific impact. *BMC Med*. 2012;10:73.
24. Coyle K. Predatory Publishers | Peer to Peer Review. <http://lj.libraryjournal.com/2013/04/opinion/peer-to-peer-review/predatory-publishers-peer-to-peer-review/>. Accessed February 5, 2014.
25. Haug C. The downside of open-access publishing. *The New England journal of medicine*. 2013;368(9):791-3.
26. Gilbert N. Editor will quit over hoax paper. *Nature News*. <http://www.nature.com/news/2009/090615/full/news.2009.571.html>. Accessed February 5, 2014.
27. Van Noorden R. Brazilian citation scheme outed. *Nature News*. 2013;500:510.
28. Van Noorden R. Record number of journals banned for boosting impact factor with self-citations. <http://blogs.nature.com/news/2012/06/record-number-of-journals-banned-for-boosting-impact-factor-with-self-citations.html>. Accessed February 5, 2014.
29. Delgado López-Cózar E, Robinson-García N, Torres-Salinas D. The Google scholar experiment: How to index false papers and manipulate bibliometric indicators. *Journal of the Association for Information Science and Technology*. 2014;65(3):446-54.
30. Kolata G. Scientific Articles Accepted (Personal Checks, Too). http://www.nytimes.com/2013/04/08/health/for-scientists-an-exploding-world-of-pseudo-academia.html?_r=2&. Accessed February 7, 2014.
31. Bogus Conferences. <http://bogus-conferences.blogspot.com/>. Accessed February 17, 2014.

32. Brooks M. Red-Flag Conferences, The Chronicle of Higher Education. March 26, 2009. Available at: <https://chronicle.com/article/Red-Flag-Conferences/44795/>. Accessed February 7, 2014.
33. Con-ferences. www.scamorama.com. Accessed February 4, 2014.
34. Graf C, Wager E, Bowman A, Fiack S, Scott-Lichter D, Robinson A. Best Practice Guidelines on Publication Ethics: a publisher's perspective. *International journal of clinical practice Supplement*. Jan 2007(152):1-26.
35. Roberts J. An Author's Guide to Publication Ethics: A Review of Emerging Standards in Biomedical Journals. *Headache: The Journal of Head & Face Pain*. 2009;49(4):578-89.
36. Lovejoy TI, Revenson TA, France CR. Reviewing manuscripts for peer-review journals: a primer for novice and seasoned reviewers. *Ann Behav Med*. Aug 2011;42(1):1-13.