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Editorial

Journal publishing: the changing landscape

Journal publishing is in turmoil with the scholarly communication system just choked with the never ending deluge of publications. Virtually every facet of the learned journal is under threat. Peer review the lynchpin of science is under increasing scrutiny for its reliability, reliance and utility. Costs of publication and dissemination through traditional publication systems are mounting while the alternative means proposed are neither satisfactory nor adequate. Publication of the learned journal that started as a professional service to colleagues – by scientists for scientists – is struggling to survive in its traditional form. Journal publication is now a huge commercial enterprise. Science publishing has generated US$9.4 billion profit from about 1.8 million English language papers each yielding revenue of about $5000 to the publisher[1]. With an annual return on investment of about 40 per cent[1], journal publishing is perhaps more lucrative for investors than the pharma sector. Despite rapid advances in IT, few scientists are aware of what is being published in their area. Open access that was meant to solve many ills of the current system has brought in a new epidemic - fake journals with counterfeit websites. With reports of unethical practices and retractions on the rise, too little tangible action and too few solutions in sight, authors, reviewers and editors are all harassed.

Peer review, which has evolved over 350 years transforming the scientific enterprise, is under intense scrutiny, criticism, and pressure. With its alleged 'unreliability' for objectively assessing research and growing costs of managing the peer review process several innovative alternatives are being tried out. The first one is to optimize the cost of peer review process it self. Typically, the critique obtained from a set of reviewers remains the property of that journal. The comments are beneficial to the authors and for the journal only if the manuscript gets eventually published. With rejection rates exceeding 90 per cent, the time and effort of huge number of diligent reviewers is therefore, not productively utilized as the critique cannot be used by the authors for submission elsewhere. If there is a system where journals formally permit authors the use the critique of rejected papers for subsequent submissions it would save a lot of time and cost. Some publishers like the Biomed Central (BMC), the Public Library of Science. (PLoS), Wellcome Trust, and the European Molecular Biology Organization have reportedly agreed to such a proposal[2]. But will the second (and subsequent) journal knowingly accept a hand-me-down manuscript?

The second innovation being tried out is the outsourcing of peer review process itself to an external agency. Rubriq, a company based in North Carolina, USA, has just started a service that aims to provide quick and efficient independent assessment for manuscripts[2]. Besides peer review, the company also offers a basic realty check to help the authors take a call on the right journal (in terms of IF, prestige, *etc.*). that the authors can reasonably expect to publish. This can possibly save time and effort of reviewers and most importantly, the avoidable reviewer fatigue. Rubriq, of course, will pay the reviewers for their time and effort and the company therefore, is reasonably confident of engaging the best to get objective and critical assessment. The authors are expected to pick up the cost of the review process. Again, some established publishers such as BMC and the PLoS with large basket of journals from several specialties and sub-specialties have reportedly expressed interest[2]. This model, if successful, can optimize the utility of the peer review and could potentially cut down journal publication costs. The encouragement for this start-up Rubriq to offer 'stand-alone peer review', appears to have enthused other entrepreneurs to offer specialized

services as statistical review and study design, *etc*[2]. However, the author-paid outsourced peer review model is unlikely to be accepted by editors as it is not considered ethical.

A Finnish company, Peerage of Science offers a similar service as Rubriq except that it is a publisher-pays model. About 20 journals have reportedly signed up with the company[2]. One very interesting feature of this innovation is that if the first publisher does not accept the paper, it could well be considered by the second or subsequent publisher. The fee to Peerage, will be paid by the publisher who will ultimately publish the paper[2].

Open review systems that attempt to address the traditional model of secrecy and associated issues of accountability of reviewers and editors, has not really taken off. Many researchers also accuse the current peer review system of not being discovery-driven but prone towards promoting elitism. Journal editors have also been known to worry more about citability than excellence using the peer review process only as a tool to boost impact factors[3]. The just launched Science Open Reviewed (SciOR) at Queen's University, Canada, is a not-for-profit service - run *by* researchers *for* researchers[4]. SciOR is an online registry service that aims to improve the traditional peer review system, a transparent and accountable open peer-review by willing scientists (about 250 as of now). Registered reviewers can upload their biodata and their fee for peer review[4]. Authors can also choose the registered reviewers, and can directly negotiate the fee with them. Registered authors can also post abstracts of their unpublished manuscripts to attract reviewers' attention. SciOR can, upon request, facilitate such transactions, of course for a nominal fee. Once a paper is reviewed by two reviewers, it is made available for registered journal editors[4]. The SciOR can also publish the paper if the authors are willing.

Web publishing through preprint servers is all poised to transform the scholarly communication system to radically improve dissemination. ''TheWeb opens the workshop windows to disseminate scholarship as it happens, erasing the artificial distinction between process and product" claims Jason Preim, information scientist from the University of North Carolina[5]. Scientists are already depositing research data in repositories as GenBank, Dryad, figshare, *etc.* Preprint servers typically make research results available to the scientific community before the publication. Such deposition of unpublished work will ensure wide dissemination to a large group of users, especially for young researchers to show-case their work ensuring clear path for claiming priority of work[6]. In contrast to physics where such a culture of prepublication dissemination is almost a rule for decades, life science effectively has no preprint culture[5].

There are already some efforts underway in that direction. PeerJ (*https://peerj.com/*), an open access journal/publisher offers a preprint server for biological sciences. But unlike the conventional preprint servers like arXir, PeerJ permits authors to post their preprints on this site with some conditions[6]. Another publisher F1000Research (*http://f1000research.com/*), unlike arXiv, figshare and PeerJ offers a hybrid model that permits posting of manuscripts for public access at the time of submission besides regular publication. Once a paper is recommended by at least two reviewers, the F1000Research indexes a paper. This model still new to biomedical sciences, is growing slowly with small pockets of primarily highly quantitative research (*e.g.,* epidemiology, population genetics)[6]. Preprint servers with wide pre-publication diffusion of science, may help in what is called as 'community evaluation' of science as a wide spectrum of scientists can, unlike conventional peer review continuously comment on the quality and relevance of reported research[6]. But some specific strategic concerns of biomedical research may however limit complete disclosure[7]. It will be interesting to see whether the excessively secretive biomedical scientists bite the bullet.

Rapid dissemination of research continues to be a serious problem for biomedical researchers due to their excessive secrecy, pay-to-access journals, *etc.* Some steps are on to give the readers a glimpse of science-as-it-happens *i.e.*, a near real-time access and availability of research data/information through access to discussions, data, analysis and description *et al*. before publication. Population biologist Carl Boettiger is practicing this 'open-notebook science' with access to their daily progress, analysis and writing while Drexel University, Philadelphia chemist Jean-Claude Bradley, publishes the entire output of his laboratory in near-real time bringing in an entirely new paradigm of 'share early, share often' approach[5]. A new journal *Push* (*http://push.cwcon.org*) permits researchers share their work through progressive uploading of new versions of their work with an open online interaction with reviewers and other users facilitated by the publisher[5]. Eventually, all these new web-based initiatives should strengthen the 'collective assessment' of peers largely

addressing the reported criticisms of the conventional peer review.

A biggest worry of editors continues to be the reproducibility of published research as every journal dreads announcing retraction of a paper. The best of the journals have failed this test[8] and it appears that there is no easy solution. Editors and reviewers always worry that there are still some uneven edges in the work which are never easy to address in the present system of peer review. With space being a major constraint, details given in the Methods section are never adequate for critical assessment. This is a serious problem in research especially impacting human health and therefore, various reporting standards have been developed.

The CONSORT (CONsolidated Standards Of Reporting Trials) Statement issued in 1996 is among the first attempts to formulate suitable guidelines to report such studies[9]. After the positive feedback of its utility and that CONSORT alone cannot address various other kinds of studies, study-specific guidelines have been developed. Currently, about 200 such guidelines are issued for various specific study designs and/or research specialties on health research[10]. In fact, the CONSORT Statement has already been revised twice. Some other reporting guidelines for other study designs include: TREND (Transparent Reporting of Evaluations with Non-randomized Designs), SQUIRE (Standards for QUality Improvement Reporting Excellence), COREQ (COnsolidated criteria for REporting Qualitative research), STARD (STAndards for the Reporting of Diagnostic accuracy studies), and GRRAS (Guidelines for Reporting Reliability and Agreement Studies)[11].

All such attempts may not have been all that successful as there has been a ten-fold rise in retraction rate over the decade with misconduct accounting for the largest share as compared to honest error or non-replicable results[12]. It appears that in many cases it was clearly a deliberate attempt by an author to cheat[13]. A Committee of Publication Ethics (COPE), UK survey on Medline retractions between 1988-2004 found 40 per cent attributable to honest error or non-replicable findings, 28 per cent to research misconduct, 17 per cent to redundant publication and 5 per cent for uncertain or unstated reasons[14]. Over its 40 years of existence, *Infection and Immunity* has retracted only 15 papers from over 28,000 published articles[15]. This prompted two US microbiologist-editors Ferric Fang and Arturo Casadevall to critically look at retraction *vis-à-vis* the 'quality' of a journal. They have come out with a "retraction index", which is a measure of how many papers journals retract for every 1,000 they publish. A strong correlation was found between the frequency of retractions and the impact factor of the journal: higher the IF more were the retractions published[15]. However, it is as yet unclear whether the rise of overall occurrence of retraction of published papers is due to increasing incidence of research misconduct or better systems of detection[15].

Another major innovation in journal publishing - open access has prompted some unscrupulous publishers to device equally 'innovative' means of exploiting the system for personal gain. Currently about 300 open access publishers publish over 11 per cent papers in thousands of journals[16]. Realizing that the author-pays model is a cash cow, some enterprising individuals have been using ingenious methods of exploiting the gullibility of inexperienced authors. This new breed of publishers branded 'predatory publishers' essentially start fake journals with counterfeit websites[16]. These journals typically have words like 'world', 'global', 'international' in titles to impress authors to submit manuscripts[16]. Some have fictitious editor(s), editorial boards and even if there are real people, their consent is almost never obtained. Once a paper is accepted for publication, the authors receive an invoice for payment. By the time the authors realize their folly, it is often too late as they must have already transferred the copyright at the time of submission/acceptance. They therefore cannot take the manuscript elsewhere. The mushrooming of such fake journals may well be difficult to check due to the tremendous pressure to publish especially for authors from developed countries. Most such publishers claim to be based in the United States, United Kingdom, Canada or Australia but could really be operating from countries like Pakistan, Nigeria or India[16-17]. Jeffrey Beall, a librarian from University of Colarado who has been tracking such 'potential, possible or predatory scholarly open access publishers' since 2008 has come out with a check-list for conducting a due diligence test to identify genuine publishers[18].

Over the last decade, the harmonious relationship between the main actors of the complex and inter-dependent system of scholarly publishing - authors, reviewers, editors and publishers - is increasingly under strain. With the ever increasing journal subscription

costs and the author-pay models, research funders and librarians are playing more active role adding to the complexity. Are journal editors getting marginalized in the process?

Will the scientific paper and journal in its present form still remain relevant? Scientists like Michael Eisen, co-founder of the hugely successful PLoS system contemptuously dismiss the current traditional scholarly publication system through peer review as archaic and should be dispensed with[1]. He considers the very idea of research being filtered and published into 'branded' journals before publication as 'bug' and 'wasteful'[1]. Eisen calls for an alternative to journal 'buckets', like using new metrics like downloads and citations, focusing on the paper rather than the journal[1]. The PLoS publishing system that has emerged as the largest and most successful publisher last year with 23464 papers is all set to shake up the traditional 'branded' journals[1]. Their new business model is seriously challenging the established traditional publishers who have enjoyed a monopoly on how scholars should talk to each other. Scientific journals in biomedical sciences, in contrast to other disciplines like physical sciences, have always been obsessively non-transparent with inadequate informal linkages between the generators and users of new information. This has been cleverly exploited by publishers. Eventually, some centralized outsourcing of the review by credible, independent entities may well replace the current journal-specific review process. This merits serious consideration. There are predictions[3] that the increasing demand for relevant information coupled with the advent of new web-based systems will eventually lead to new tools for reliability and assessment of published record reducing dependence on research paper and the traditional journal. Nobelist Peter Medawar[19] famously called the scientific paper a fraud in view of its incomplete representation of the processes of thought of research. Major funding agencies like the NIH and NSF, USA have already started moving away from research papers in journals to 'products' like datasets, software and other tangibles developed by applicants for consideration of funding[20]. We are in the most exciting times of learned journal publishing.

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