

## COMMENTARY

### **The Importance of Retractions and the Need to Correct the Downstream Literature**

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The past three to four years has seen—as far as can be perceived—what appears to be an increase in retractions (Fanelli 2013), possibly due to an increase in awareness. This awareness relates to the issues underlying science publishing, whether these involve authorship issues, publisher-related ethics, or what appears to be an explosion in open access journals (Butler 2013), which is making more science more visible to a wider audience. This aspect in itself is an extremely positive development, and we have only to thank the freedom of the Internet and the existence of increasingly global databases, some of which are publisher-controlled, for creating this wider perspective on science and science publishing. However, like anything in life, or society, with such openness comes a darker side. The issue of revelations and anonymous whistle-blowing (Yong, Ledford, & Van Noorden 2013) are all aspects of science publishing that may have been poorly discussed even as little as 5 or 10 years ago. Now, with tools such as Retraction Watch (<http://retractionwatch.com/>) and other blogs that allow for greater awareness and interaction about publishing, and sites like PubPeer (<https://pubpeer.com/>) or PubMed Commons (<http://www.ncbi.nlm.nih.gov/pubmedcommons/>), which allow for a more frank and open discussion of the issues surrounding individual papers or topics, science publishing has, without a doubt, entered a new era of debate, and scrutiny. Those who do not observe this change, who find it insipid, or who wish to ignore it, ultimately risk becoming its victims. This increase in awareness has also drawn the attention and focus to research misconduct, including duplications, plagiarism, and even the issue of fake peer reviews (Ferguson, Marcus, & Oransky 2014), and pseudo-scientific journals or paid-for authorship (Seife 2014). These are issues that affect all scientists and that have now become the centerpiece of science publishing. Thus, greater

awareness, and acceptance, of these issues is required.

One of the greatest emergent issues that has not yet been explored or resolved is the need to correct the downstream literature. When a manuscript is retracted—for whatever reason—it effectively ceases to exist in the literature. Even if the data within that manuscript is valid—to any extent—unless that paper or portions thereof is republished one can claim that a retracted paper represents a case of null and void science literature, and should thus not be referenced for one simple reason: Theoretically, it no longer exists. Although the retraction notice and the retracted paper should remain as part of the public, open access record, to serve as a historical beacon to highlight each and every case, a retracted paper should—save for rare exceptions—not be referenced, nor should its use as a citation serve for the purpose of increasing a journal’s citation metrics, such as an impact factor.

Here I focus on a case from the medical literature. In this case, Shigeaki Kato, formerly a researcher from The Institute of Molecular and Cellular Biosciences at the University of Tokyo, now has 33 retractions that have been cited almost 700 times (Oransky 2014). The Japanese media (*Mainichi Weekly*) indicated, following an investigation by the University of Tokyo, that 43 papers should be retracted. This indicates that there are still potentially 10 of Kato’s papers that will be removed from the scientific literature. In that sense, the scientific literature has been partially corrected, but not fully. What about those papers that cite the 33 already retracted papers? That literature (hereafter, secondary paper) is now citing de facto nonexistent literature. Thus, any scientist who then references a secondary paper is also indirectly propagating the error. This infinite cascading effect will undoubtedly influence the metrics of a journal, such as its impact factor, even if to a small extent. What then should happen, and who should be held responsible for correcting the downstream literature, i.e. the secondary paper(s)?

At the outset, it is the corresponding author of the retracted paper who should be responsible for contacting the authors, editor, and/or publisher of the journal that cites the retracted paper, and requesting an erratum. The erratum should indicate clearly that that reference has now been retracted, and ideally should provide the web link and as much detail as possible, to alert readers to this important background. Should the author not assume this responsibility, then it is incumbent upon the author’s institute and/or co-authors to then assume that responsibility, and if that responsibility is not assumed then the authors, editor, and/or publisher of the journal that cites the retracted paper are ultimately responsible for correcting the literature—with a *corrigendum*—even if, in the latter case, it is not their fault that the

literature has become erroneous. In the case of Shigeaki Kato, there are at least 677 citations from 33 retracted papers. Those numbers in themselves are not worth much to scientists and science itself, but should a random number of retractions be assumed from the wider science literature—a ballpark number of let's say 5,000—and factor in the multiplicative downstream effect of downstream referencing, then the issue becomes not only critical to the integrity of science publishing, it becomes alarming. Simply because we are then dealing with potentially tens of thousands, if not hundreds of thousands of errors, caused exclusively by the existence of retractions, in the downstream literature. This has profound implications not only on the science literature, but also on science education, which relies on an accurate scientific literature for didactic purposes. Should the basal literature be flawed, then there is also the very real risk that the education system (via incorrect teaching materials) can start to become corrupted. The other issue that exists is the potential economic fallout from retractions and an erroneous literature, least of which is wasted taxpayers' money (Resnick 2014).

Very rarely can one observe errata that correct the literature by acknowledging the existence of a retraction within the reference list, but this is an urgent and important aspect that has to be increasingly adopted and accepted not only by the wider scientific community of researchers, but also by editors and publishers. Simply because, within the context of post-publication peer review (Teixeira da Silva 2014), correcting the downstream literature constitutes not only an integral element of accountability in science, but also one core responsibility of authors, editors, peers, and publishers (Teixeira da Silva 2013a). Moreover, as publicly questioned papers raise greater awareness and thus increase the risk of retractions (Van Noorden 2014), so, too, should increased public awareness allow for better correction of the downstream literature related to a retraction. Only through a holistic approach can integrity in science publishing be achieved (Teixeira da Silva 2013b).

There is also, of course, a segment of the scientific community that believes that the downstream literature does not need to be corrected, and hence the need for greater discussion. In the brief period of time that this paper was in re-review, retractions by two more high-profile scientists in their fields of study, Jacob H. Hanna of the Weizmann Institute of Science in Israel (Marcus 2015) and Robert A. Weinberg at the Massachusetts Institute of Technology in the USA (Ferguson 2015), whose papers are also cited several hundred or thousands of times, fortify the need to address this issue as urgently as possible.

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