



Evaluating How We Evaluate

Our scientific work is subject to continual scrutiny. Scientific papers are evaluated by reviewers and journal editors, and we vie for precious real estate in the prime journals. Published papers, in turn, are an important metric in evaluating career advancement and grant support. How well are the systems by which we evaluate papers, grants, and promotions working? Are they adapting to changes in science, new publication options, and new career structures? Are they producing and rewarding the best possible science and meeting the needs of young scientists?



Ron Vale

Fortunately, the mechanisms by which we evaluate science are by no means broken, and arguably adopt higher standards of fairness and rigor than do those of many occupations. The scientific profession is fundamentally a meritocracy. In the best practice of evaluating “merit” (good science), evaluation consists of a review process involving scientific peers from multiple institutions and sometimes different countries. Having witnessed the high sense of responsibility with which scientists in study sections judge grant applications from their peers, I have strong confidence in the peer review system.

However, occasionally we should “evaluate how we evaluate” and ask whether elements of the system can benefit from fine tuning. This article is intended to open such a discussion. The opinions in the article are my own and not a consensus view of the ASCB. If you want to participate in the discussion and share your views, please add comments on the ASCB Facebook page (www.facebook.com/AmerSocCellBio). I will try to respond to as many comments as I can during the month of May.

Are We Evaluating Scientific Quality or Outsourcing This Responsibility to Journals?

“Let’s try for *Science*, *Nature*, or *Cell*!” exclaim a student/postdoc and his/her advisor. These

outstanding journals reach a wide audience, who scan through the tables of contents to find exciting science. Clearly, the primary driving force pushing submissions to these journals at the current frenzied rate is the opportunity for career advancement. Publications in *Science/Nature/Cell* are golden eggs in a CV that significantly enhance chances for getting jobs and grants.

In a meritocracy, evaluation of productivity is necessary and judgment of good, mediocre, or poor science comes into play. But have we dug ourselves into a rut by becoming so heavily reliant on journals and their associated impact factors for making decisions about quality?

Have we effectively created a system whereby we are outsourcing to journals too much of our responsibility in the process of evaluation? A rationale for the present reliance on the journal hierarchy as a proxy for quality is that top journals receive many papers and, in partnership with scientific reviewers, invest considerable energy to sort through them to identify the best science. While this seems like a perfect Darwinian selection system to tap into, we also are aware of the flaws. Journals also look for particularly newsworthy content to enhance their images (which they have the right to do) and not always for the best science. There also is a tendency to accept papers (given the large numbers of submissions) that have a clean bill of health from three or four reviewers, which is not necessarily a metric of outstanding science. Furthermore, many outstanding papers were never submitted to the test of the “top journals” in the first place. Many scientists are content to have the visibility offered by PubMed, and the top journals offer less space than many others.

There is increasing disgruntlement in our scientific community about the growing importance of the “where” rather than the “what” in evaluating publications. This emphasis is creating more submissions, as scientists often serially test their work down the journal food chain, thus wasting time and creating anxiety among students and postdocs. However, I would argue that the fault does not lie with journal editors and their staffs; their job is to make

The American Society for Cell Biology

8120 Woodmont Avenue, Suite 750
Bethesda, MD 20814-2762, USA
Tel: 301-347-9300
Fax: 301-347-9310
ascbinfo@ascb.org, www.ascb.org

Officers

Ronald Vale	<i>President</i>
Don W. Cleveland	<i>President-Elect</i>
Sandra L. Schmid	<i>Past President</i>
Thoru Pederson	<i>Treasurer</i>
Kathleen J. Green	<i>Secretary</i>

Council

Sue Biggins
David Botstein
A. Malcolm Campbell
Raymond J. Deshaies
Benjamin S. Glick
Akihiro Kusumi
Inke Nāthke
Mark Peifer
James H. Sabry
David L. Spectro
Jo Ann Trejo
Yixian Zheng

The ASCB Newsletter
is published 11 times per year
by The American Society
for Cell Biology.

W. Mark Leader	<i>Editor</i>
Johnny Chang	<i>Production Coordinator</i>
Kevin Wilson	<i>Public Policy Director</i>
John Fleischan	<i>Science Writer</i>
Thea Clarke	<i>Director, Communications and Education</i>

Advertising

The deadline for advertising is the first day of the month preceding the cover date. For information contact Advertising Manager Ed Newman, enewman@ascb.org.

ASCB Newsletter
ISSN 1060-8982
Volume 35, Number 4
May 2012

© 2012 The American Society for Cell Biology. Copyright to the articles is held by the author or, for staff-written articles, by the ASCB. The content of the *ASCB Newsletter* is available to the public under an Attribution-Noncommercial-Share Alike Unported Creative Commons License (<http://creativecommons.org/licenses/by-nc-sa/3.0>).

Postmaster: Send change of address to:
ASCB Newsletter
The American Society for Cell Biology
8120 Woodmont Avenue, Suite 750
Bethesda, MD 20814-2762, USA

[I]n evaluating qualifications for a grant, a job, or a promotion, it is too simplistic to think that judgment has already been rendered by prior competition for the most prized journal pages.

their journals successful. Rather it is our job as a scientific community to evaluate published scientific work; we have created the predicament in which we find ourselves. There is no denying that *Cell*, *Nature*, and *Science* publish truly outstanding scientific studies. But in evaluating qualifications for a grant, a job, or a promotion, it is too simplistic to think that judgment has already been rendered by prior competition for the most prized journal pages. We all know of plenty of cases where papers published in the “best journals” sink in esteem after publication while other papers in the “lesser journals” rise in their impact.

What can be done to dig ourselves out of this rut? The problem is complex, and changes cannot happen overnight. However, the first step is recognizing that peer evaluation is our responsibility.

Second, our scientific community might do well to reassert the value of publishing outstanding science in specialty journals. By “reassert” I mean return to the view held by previous generations of scientists. While *Science* and *Nature* have been *the* places to publish important and provocative short communications for more than a century, prior generations of scientists often chose to publish their more complete, but still high-impact, studies in journals such as the *Journal of General Physiology*, the *Journal of Biological Chemistry*, and the *Journal of Cell Biology*. More recently, the ASCB’s own *Molecular Biology of the Cell* has become a fine venue for such work. But the phrase “better fit for a specialty journal” has become an uncomplimentary, lethal blow in the review process. Furthermore, now that online supplementary material can enable five years of work to be compressed into a published report of around 2,000 words, the broad-interest journals have encroached into the niche of the longer-format specialty journals.

Most importantly, scientists must be willing to evaluate and come to their own conclusions about the scientific merit of published work. We do not have a good general scheme for achieving this, and efforts such as Faculty of 1000 have not succeeded in affecting evaluations. However, we can make inroads as individuals rather than waiting for new schemes. We can make an effort to articulate and explain the value of scientific studies, and refrain from just using journal names as primary evidence of merit. For example, it is not uncommon for a grant discussion or evaluation letter for promotion

to begin with, “In the past five years, the PI has published six papers, two of which were published in *Cell*.” Chances are that the work is excellent and the PI highly productive, but we should kick the habit of citing work in high-profile journals as if the venue is all you need to know!

Not uncommonly, scientists who are themselves unhappy with this system succumb to it when it is their turn to write/present an evaluation. Even we scientists can be too easily swayed by the sparkle of a high-profile paper on a CV. Furthermore, with so many papers and a shortage of time for reading and understanding them, counting jewels on a CV is easy and provides a path of least resistance. Impact factors also are easy tools for administrators who do not understand the science themselves. Thus, as a community, we could gradually help the situation by the language through which we describe science quality.

Numbers of Publications: How Many Is Enough? Quantity or Quality?

In addition to where a scientist has published his or her work, evaluating committees also look at publication numbers as evidence of productivity. However, the numbers game is changing, and evaluating committees cannot be frozen in time with expectations from the past.

To see an illustration of this point, open this week’s volume of *Nature* (2012) and compare it with an issue published 30 years ago (1982). The Letters are about the same length and have three or four figures. However, in this week’s issue, the four figures are likely packed with multiple panels, and the article may be accompanied by a supplementary information section with an additional 10 multipanel figures. The work begins with a high-throughput screen and ends with a mouse knockout, so that it is not viewed as too preliminary. Hidden from view may be the fact that panels in one figure and four supplemental figures were generated in response to 25 comments from four reviewers and are based on experiments that required more than six months to perform. In contrast, the typical 1982 Letter also had excellent science, but was usually less of a magnum opus and obviously had no online supplementary material.

Science is not harder in 2012 than it was in 1982, and in many ways has become

easier with the many tools available. However, the experimental threshold required for publication has escalated in the last 30 years. And experiments take time. We have now reached a point where publishing an outstanding study may require approximately four years. Therefore, in my opinion, expecting two or three publications from a graduate student or a postdoc is not realistic (or indeed necessary), especially if we want students to graduate sooner and postdocs to start their independent careers earlier when they have the energy to do so. Furthermore, institutional expectations for more publications can create pressures that run counter to the goal of producing more complete and interesting scientific studies.

How can the evaluation system be tilted to favor outstanding science over a long CV of publications with minimal impact? The Howard Hughes Medical Institute's solution in their review process is to ask the investigator for the five most important publications since his or her last review along with a brief explanation of why each paper is significant. Focusing attention on a few papers draws attention to quality and not just quantity. This general strategy could be adopted in many kinds of evaluation settings.

Community and Education as Factors for Advancement

Papers and grant support are the gold currency for promotion in many academic institutions; achievements in education and community service tend to be much less valued. While scholarly achievement and grants sustain the core mission of research institutions, education and community service are also important and creative endeavors; they contribute immensely to the culture of an institution and the future of our profession. These efforts should be respected and deserve more than lip service during a review for academic promotion. Academic evaluation predicated too narrowly on papers and impact factors steers young scientists away from education/community activities if these activities contribute only minimally to the overall

evaluation. This sends the wrong message to young scientists, especially at a stage when they are altruistic as well as desiring to advance their careers.

What steps could be taken to increase the importance of education/community service in evaluations? This is an issue that needs to be addressed primarily by individual institutions and laboratories. The value of education and community service needs to be part of the message and priority that department chairs communicate to their faculty; it should also be inherent in the values that senior faculty convey to their postdocs and students. "Impactful" has become an adjective that precedes "paper," but it should be more broadly used to describe activities by which scientists contribute to society and our profession. An initially high-flying paper might be largely forgotten a year later, while important educational/institutional activities could have influential ripple effects decades later.

[I]nstitutional expectations for more publications can create pressures that run counter to the goal of producing more complete and interesting scientific studies.

Conclusion

As stewards of our profession, we have a collective responsibility to consider how to disseminate knowledge through publication and how to advance graduate students to postdocs, postdocs to assistant professors, and assistant professors to tenure and beyond. These processes are not out of our hands, predetermined, or immutable. What do we value? What are we rewarding? Are current metrics working, are they changing with the times, and are we investing sufficient time and effort in the evaluation process?

Achieving consensus answers to these questions is difficult. Moreover, dramatic changes to evaluation metrics or habits at the level of large institutions are difficult to achieve. However, as discussed in this article, much can be done by individuals in how we write letters of recommendation and summaries of grants, verbally convey productivity and achievement in grant or promotion committees, and mentor younger scientists to become both good researchers and good citizens. ■

An expanded version of this essay will appear in Molecular Biology of the Cell.

"Impactful" has become an adjective that precedes "paper," but it should be more broadly used to describe activities by which scientists contribute to society and our profession.