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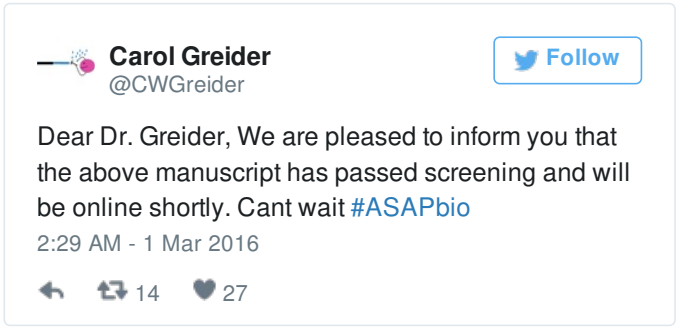
SCIENCE

Handful of Biologists Went Rogue and Published Directly to Internet

By **AMY HARMON** MARCH 15, 2016

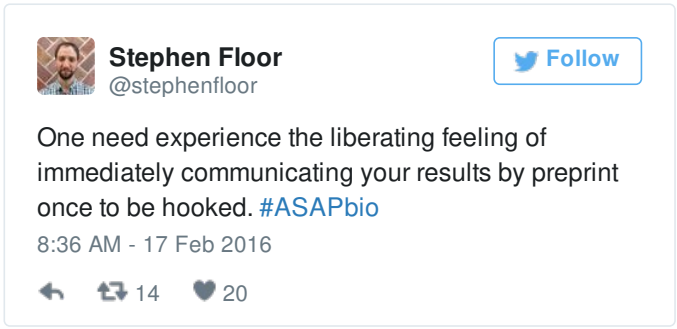
On Feb. 29, Carol Greider of Johns Hopkins University became the third Nobel Prize laureate biologist in a month to do something long considered taboo among biomedical researchers: She posted a report of her recent discoveries to a publicly accessible website, bioRxiv, before submitting it to a scholarly journal to review for "official" publication.

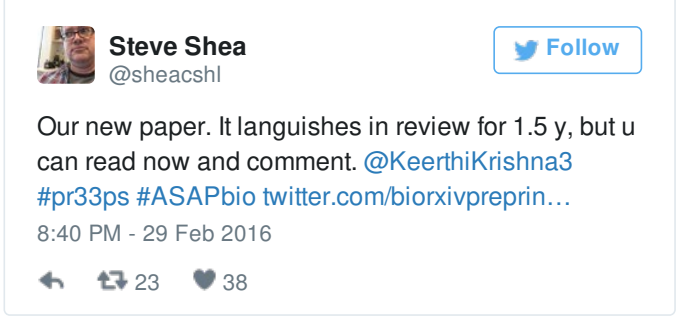
It was a small act of information age defiance, and perhaps also a bit of a throwback, somewhat analogous to Stephen King's 2000 self-publishing an e-book or Radiohead's 2007 release of a download-only record without a label. To commemorate it, she tweeted the website's confirmation under the hashtag #ASAPbio, a newly coined rallying cry of a cadre of biologists who say they want to speed science by making a key change in the way it is published.



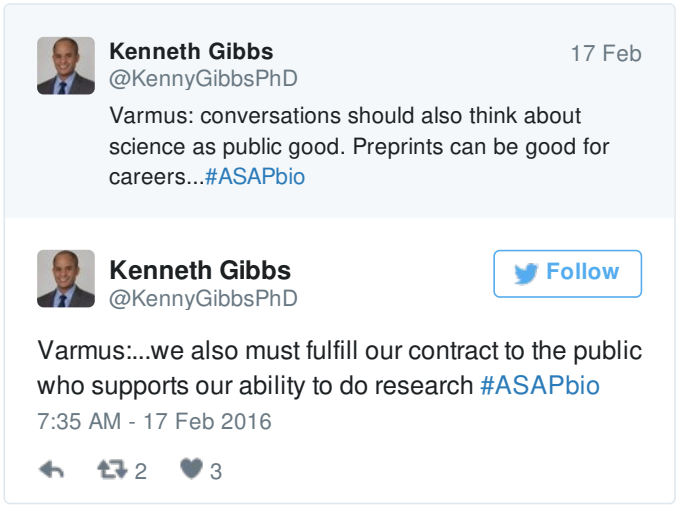
Such postings are known as "preprints" to signify their early-stage status, and the 2,048 deposited on three-year-old bioRxiv over the last year represent a barely detectable fraction of the million or so research papers published annually in traditional biomedical journals.

But after several dozen biologists vowed to rally around preprints at an "ASAPbio" meeting last month, the site has had a small surge, and not just from scientists whose august stature protects them from risk. On Twitter, preprint insurgents are celebrating one another's postings and jockeying for revolutionary credibility. (These two are from a molecular biologist at the University of California, Berkeley and a Cold Spring Harbor neuroscientist.)





For most of the history of organized scientific research, the limitations of technology made print journals the chief means of disseminating scientific results. But some #ASAPbio advocates argue that since the rise of the Internet, biologists have been abdicating their duty to the public — which pays for most academic research — by not sharing results as quickly and openly as possible. As Harold Varmus, another Nobel Prize recipient and former director of the National Institutes of Health put it in a widely tweeted talk at the conference:

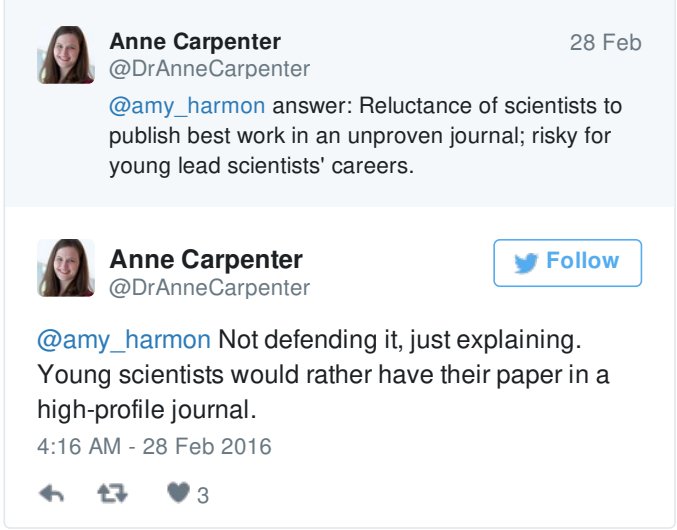


Unlike physicists, for whom preprints became a default method of communicating discoveries in the 1990s, biomedical researchers typically wait more than six months to disseminate their work while they submit it — on an exclusive basis — to the most prestigious journal they think might accept it for publication. If, as is often the case, it is rejected, they try another journal. As a result, it can sometimes take years to publish a paper, which is then typically available for a time only to colleagues at major academic institutions whose libraries pay for subscriptions. And because science is in many ways a relay, with one scientist building on the published work of another, the communication delays almost certainly slow scientific progress.

Researchers say they participate in the process in large part because the imprimatur of highly selective journals like Science, Nature and Cell has come to be viewed as a proxy for quality science. Like a degree from certain colleges, a study in an elite journal can be a passport to jobs, funding and promotions.

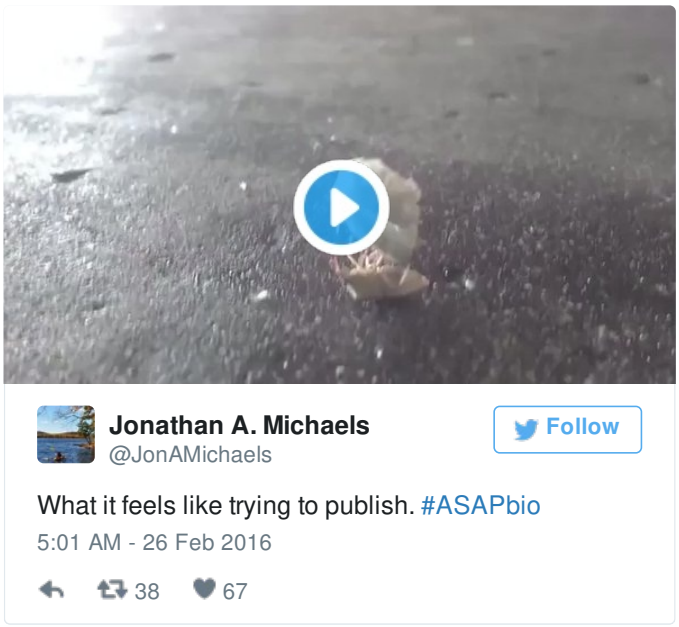
While several influential journals, including Science and Nature, have a stated policy of treating preprints on an equal footing with papers that have not been posted elsewhere, few biologists have chosen an option they fear will handicap already slim prospects of acceptance. Some journals have a policy of not considering preprints. And others, like Cell, say prospective authors who wish to post preprints must ask first.

Anne Carpenter, a computational biologist affiliated with the Broad Institute of M.I.T. and Harvard said that she thinks that many young scientists prefer sticking with high-profile journals because the alternative just seems to too risky.

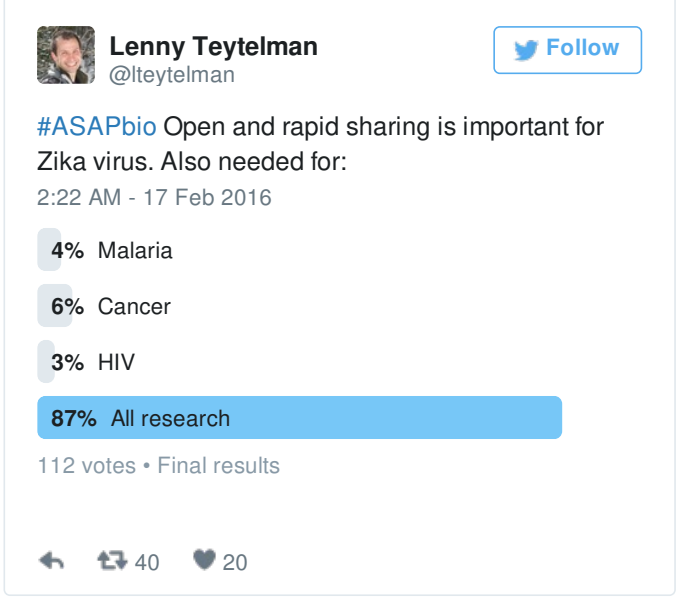


Beyond career concerns, many scientists say science as a whole benefits from the kind of peer review that has been a fixture of scientific publishing, in which journal editors ask other scientists in a field to flag obvious errors and assess the importance of a work before publication. Yet another Nobel Prize laureate, Randy Schekman, a cell biologist at the University of California, Berkeley, has argued for its importance even while supporting preprints.

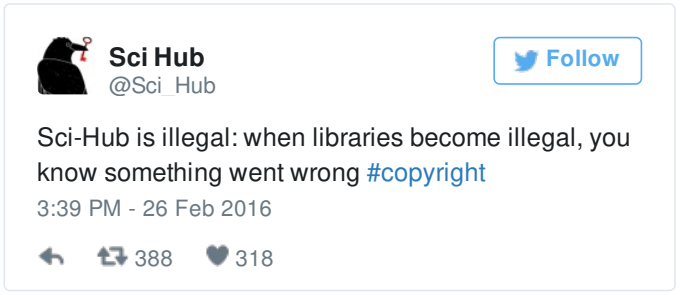
But many biologists have begun to chafe at a system that one neuroscientist recently compared to a bug on its back trying to flip itself over while endlessly rotating a piece of what appears to be Styrofoam.



The delays prevent scientists from showing off their most recent work to prospective employers or benefactors. They have also, some researchers say, begun to look faintly absurd against the general expectations for speed and openness in the not-so-new digital age. With the rapid spread of the Zika virus, for instance, several journals signed a statement promising that scientists would not be penalized for immediately releasing their findings, given the potential benefit for public health, in turn prompting some scientists to ask, why draw the line at Zika?

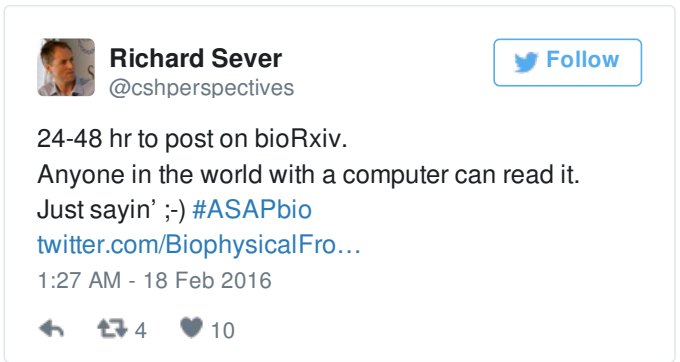


Then there is the researcher in Kazakhstan who has become a kind of science cult hero by pirating every academic paper for which journals require payment and making them available on a free site called Sci-Hub. Though few think that is a long-term solution, one website has called her the "Robin Hood of Science."

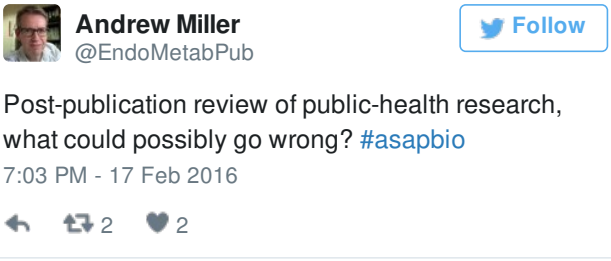


And many #ASAPbio supporters retweeted John Hawks, a paleoanthropologist from the University of Wisconsin, who found himself recently at an African university where a paper on African genomes was unavailable because it could not pay the fee for the journal where it was published, and no preprint was available. He expressed his frustration with a profanity.

In such contexts, the observation of Richard Sever, who runs the bioRxiv server at Cold Spring Harbor Laboratory, considered the best known place to post biology preprints, becomes harder to ignore, researchers say.



Some journal editors say that preprints would be detrimental to science. Emilie Marcus, the editor of Cell, told scientists at the #ASAPbio conference that in conversations with more than 100 scientists Cell editors had found that the main reason they wanted to use preprints was to scoop competitors, which she suggested would cause the quality of papers to decline as everyone rushed to post first: "Is that the direction that we want to go?" Others have argued on Twitter that allowing research to reach the public without being reviewed before publication would be irresponsible.

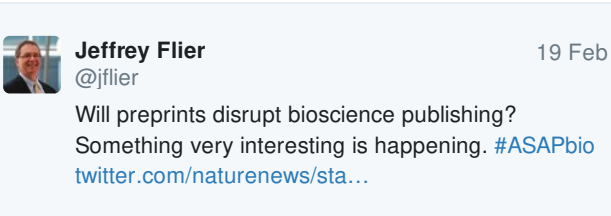


Preprint advocates counter that scientists care too much about their reputations to publish shoddy work, and posts to bioRxiv are clearly marked to indicate that they may contain information that "has not yet been accepted or endorsed in any way by the scientific or medical community.'' Others note that plenty of peer-reviewed papers in high-profile journals have proved to be wrong, and some argue that carrying out peer review after a paper is published would provide a more rigorous and fair vetting of papers, anyway.

Unlike some writers and artists who have used digital media to escape entirely from middlemen, most biologists tweeting with #ASAPbio want to maintain a relationship with traditional journals. Many have taken pains to reiterate their wish not to disrupt the journal system, only to enhance it. With enough scientists pushing to legitimize preprints, they hope journals will allow the systems to coexist.

"It's not beer or tacos," as James Fraser, an assistant professor at the University of California, San Francisco put it at last month's conference, "it's beer AND tacos."

But others, including the dean of Harvard Medical School, Jeffrey S. Flier, say disrupting journals could be a good thing for science.



In any case, some researchers say, a détente between journals and preprint advocates may be short-lived. If university libraries drop their costly journal subscriptions in favor of free preprints, journals may well withdraw permission to use them, forcing biomedical researchers to make a harder choice. The preprint movement, some #ASAPbio advocates argue, may presage the need for a greater cultural shift than scientists have yet been willing to make: evaluating one another based on the substance of their papers, not where they are published. But it does, Michael Eisen, a longtime advocate for scientific publishing reform at the University of California, Berkeley, told his colleagues, help move this area of scientific publishing "into the 20th century.''