a Rationalist. London (UK): Pemberton Publishing Company Ltd; p. 137). He wrote that one source is theoretical work, "If Newton's theory of gravitation is true, the equator should be farther from the earth's centre than are its poles. This was found to be the case after Newton's death. If light consists of electromagnetic oscillations, radio communication should be possible. . . . Once a theory becomes mathematical, it is possible to suggest experiments and observations whose results are a very long way from those which would be predicted on a basis of common sense and some imagination" (Haldane 1968:137–138). The other source of original ideas, according to Haldane, was observation. He noted that a few people have the capacity for noticing the exceptional very highly developed. This may lead to experimental work. Haldane used to mention the example of Calvin Bridges (in T. H. Morgan's group) who possessed the exceptional capacity for detecting mutants of *Drosophila.* Haldane wrote: "It is an essential part of scientific method to expect the unexpected" (1968:140). However, he concluded that "almost everything which is spoken or written about scientific method is arrant nonsense. . . . It is indeed presumptuous to attempt to analyse the principal growing point of the human spirit" (Haldane 1968:144).

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Stepping in the Same River Twice: Replication in Biological Research.

Edited by Ayelet Shavit and Aaron M. Ellison; Foreword by W. John Kress. New Haven (Connecticut): Yale University Press. $65.00. xxii + 318 p.; ill.; index. ISBN: 978-0-300-20954-9. 2017.

Arguably, the recent focus on the trustworthiness of scientific publications began with John Ioannidis' paper on why most published research findings are false (2005. *PLOS Medicine* 2:e124). Such concerns were amplified by reports that biotechnology firms, such as Amgen, had attempted to reproduce what they deemed to be "landmark" studies; in the Amgen experience it was reported that approximately 11% (6 out of 53) observations could be reproduced (see C. G. Begley and L. M. Ellis. 2012. *Nature* 483: 531–533). The situation has been exacerbated further by examples of the publication of flawed papers in high-profile journals (see, as an example, F. Wolfe-Simon et al. 2010. *Science* 332:1163–1166), a situation analyzed in a tongue-in-cheek, but largely accurate, manner in a blog post by Michael Eisen (2013. http://www.michaeleisen.org/blog/?p=1439). There are also the pernicious effects of the pressure (seduction) to popularize observations—which we might term "TED-talk" disease. This seems particularly prevalent in the world of psychological research, given its more direct relevance to people—the controversy around power posing is just one such example (see D. Z. Morris. 2016. "Power poses" researcher Dana Carney now says effects are "undeniably" false. http://fortune.com/2016/10/02/power-poses-research-false/).

This book, a thematically coherent collection of 17 chapters, which includes some thought-provoking philosophizing, focuses on the issue of experimental replication, primarily in ecological research, with some consideration of other scientific/biological areas (there is one explicitly biomedical chapter and three chapters on meta-analyses and the analysis of publicly available data sets). A major theme of the volume is primarily on technical details of replication, a number of chapters address questions that involve the placement and monitoring of sensors, the counting of organisms in a study area, and the characterization of specimens in a research archive, something that, as a cell/molecular biology type, I am largely unfamiliar with—and I expect experimental (in contrast to observational) biologists will find this aspect of the volume largely tangential to their interests. As a whole, the book is concerned with the details of how many times a measurement or an experiment needs to be carried out (and exactly how the data are analyzed) before it can be considered adequately determined for inclusion in a manuscript or a data set.

Replication as such is somewhat different from reproducibility; typically measurement replication is carried out by the original research group, whereas the reproduction of a study is likely to be attempted by other researchers, as part of an effort to extend conclusions to new systems, new situations, or to a higher level of resolution. The most important outcome of replication is not replication per se, but the need to establish: whether an observation is perceived as impactful, changing the way other researchers approach a system or problem and whether the observation is robust—that is, whether it can be readily confirmed. If not, the original observation or conclusion is likely to be due to minor, idiosyncratic factors, rather than generalizable trends and mechanisms.

Although the accuracy of experimental details and conclusions found in published papers is clearly important, there are many factors that combine to undermine the best intentions of researchers—the hypercompetitive nature of the grant funding process and the emphasis on high-profile research reputation, often based more on where a work is published than whether it has (over time) had a substantial impact on a field, generates a difficult-to-ignore selective pressure to hype and overinterpret (what we might term anticircumspection). Such an emphasis generates a high level of noise in the system; a level of noise that is further amped up by the expansion of the scientific community and the proliferation of what have been termed predatory journals, which together have combined to challenge the integrity of the research community.

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THE CHICAGO GUIDE TO COMMUNICATING SCIENCE. *Second Edition. Chicago Guides to Writing, Editing, and Publishing.*

By Scott L. Montgomery. Chicago (Illinois): University of Chicago Press. $25.00 (paper). xiii + 336 p.; ill.; index. ISBN: 978-0-226-14450-4 (pb); 978-0-226-14464-1 (eb). 2017.

In the years since the 2003 publication of the first edition of *The Chicago Guide to Communicating Science*, scientists' communication (dis)abilities have been the subject of growing attention. Scientific leaders increasingly beseech their colleagues to "go public," client lists for science communication training organizations swell, and numerous books aim to teach the art of communicating to researchers. In this second edition, Montgomery reminds us why his contribution about this timely subject should be at the fingertips of all working scientists.

That the author excels at demystifying the language of science will surprise no one who is familiar with the original edition. Montgomery again provides accessible, actionable advice that will help researchers excel at the fundamentals of their craft, from writing and reviewing scientific manuscripts to drafting compelling grant proposals and to delivering engaging oral presentations. However, it is in the second edition's newest material that the book truly shines. The author's exploration of new topics such as teaching science communication, communicating science to public audiences, science translation, and online communication necessarily address the increased dynamism of the modern communication ecosystem for science.

The volume's detailed advice is anchored by at least four overarching themes. First, Montgomery realizes that a scientist's ability to effectively integrate practical communication skills hinges on his or her conceptual understanding of communication. He notes, "changing people's ability to communicate often begins with changing their sensibility about communicating" (p. 311). This realization means that the concrete advice the author provides is connected to foundational normative, historical, and structural issues that shape science communication. Without this anchoring information, teaching a scientist specific communication skills would be akin to teaching a teenager how to operate a manual transmission without first explaining the purposes of a car. This may seem like common sense, but science communication advice too often prioritizes details (e.g., how do I get more followers on Twitter?) without first addressing the broader and more important communication issues (e.g., is social media a smart use of my time given the goals I have for my communication efforts?).

Consistent with Montgomery's efforts to improve scientists' baseline communication sensibilities is his argument for scientists to view communication as an increasingly crucial tool for career advancement. His desire for scientists to approach their communication efforts with *strategic* thinking is wholly appropriate given the accessibility of modern media technologies and their potential impacts—both desired and undesired. For readers who may feel intimidated by the picture the author paints, he advises scientists to call upon support from the public information officers associated with their organizations. He also consistently reminds readers that when it comes to communicating better, there are no more valuable teachers than experience and inspirational examples.

Overall, the book drives home an essential point: when engaging in communication activities—whether they be with the scientific community or public stakeholders—scientists must approach these efforts *scientifically*. That is, they need to be strategic, thoughtful, authentic, and open-minded as they wade into the new media landscape.

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ZOOLOGY

MYXOMYCETES: BIOLOGY, SYSTEMATICS, BIOGEOGRAPHY, AND ECOLOGY.

Edited by Steven L. Stephenson and Carlos Rojas. Academic Press. Amsterdam (The Netherlands) and New York: Elsevier. $84.96 (paper). xx + 454 p.; ill.; index. ISBN: 978-0-12-805089-7. 2017.

This book opens with an introduction to the basic biology of myxomycetes, with striking images of their morphology. The following chapter, on the history of myxomycete study, is fascinating—it is extremely rare to find this information compiled in a single place. The updated phylogeny information presented in Chapter 3 is timely; however, the authors are rightly cautious, highlighting the need for a great deal more molecular work before the evolutionary history of the myxomycetes is as well understood as that of many other taxa. Similarly, the review of the recent geno-