



GETTING PUBLISHED *in the* LIFE SCIENCES

RICHARD J. GLADON · WILLIAM R. GRAVES · J. MICHAEL KELLY



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PREFACE

This book evolved from a course we taught to students in the life sciences at Iowa State University. Most institutions of higher learning do not have a formal course that teaches the processes associated with preparation of a manuscript for a refereed journal. At Iowa State University, students usually take this course when they begin to write their undergraduate research project report or, more commonly, their thesis or dissertation. This book will also be useful for professional scientists who would like to increase their ability to communicate their work to an audience. Ultimately, the main goal of this book is to make it easier for a scientist to write journal articles, and it was developed to guide inexperienced writers through the process of manuscript development and submission to a refereed journal in the life sciences. However, the book should not be limited to writers in the life sciences, and scientists in other disciplines will also find it useful for developing their writing skills.

Part I of this book addresses issues the author(s) must consider before they enter the writing stage, and maybe before they enter the thinking and organizing stage. This section also contains a chapter devoted to ethics in publishing. Part II presents our method for developing and writing the manuscript. Part III recreates the scenario of submission, external peer review, revision, and other miscellaneous events that occur after the manuscript has been written, submitted, and accepted.

Books and manuals are available to assist inexperienced students and professionals with their writing for a refereed journal. These publications are valuable. However, the manner in which the writer typically learns to construct the manuscript often leads to expansion of the scope of the article rather than development of a focus on specific points. In the end,

much more has been written than can be accommodated in a typical manuscript, and the writer must reduce the length and content of the manuscript to bring it into compliance with the current standards of the journal of choice. This can be very difficult for an inexperienced writer, especially students who recently finished their thesis or dissertation research, and feel all their data must be presented. Thus, frustrations set in, and productivity wanes. Our approach to organizing, developing, and writing the manuscript is quite different, and it helps to streamline the entire writing process.

Our book differs from others because the focus throughout is on how the writer can unequivocally convey the most salient information to the reader. We call these packages of salient information “take-home messages,” and the manuscript is built around them. After the take-home messages have been developed, the writer adds to the manuscript only the information that provides the evidence needed to support, and prove, those take-home messages.

Another unique feature of this book is our liberal inclusion of exercises we have developed while teaching the course. These exercises help novice writers build a solid foundation, and they allow experienced writers to improve their skills in manuscript development. Our core philosophy is to advance science by conveying take-home messages clearly and concisely. Our success rate has been very good. About two-thirds of the manuscripts developed in our course are published, and this is especially significant when one takes into account that our students are usually first-time writers of manuscripts for refereed journals.

We must add a word of caution to this preface. Use of this book, the principles within it, and the exercises within it, cannot cure bad science. Make sure you use good

scientific processes and you execute the scientific method to the letter. Bad scientific procedures and practices cannot be repaired; they only can be renovated. A writer cannot compensate for that bad science with an extremely well written manuscript.

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We are grateful to our mentors, peers, and students, who have inspired much of the content of this book. For example, Dr George L. Staby introduced the idea of developing take-home messages to his graduate student Richard J. Gladon at The Ohio State University. William R. Graves and Richard J. Gladon both benefitted from a research-writing class at Purdue University taught by Dr Charles Bracker. All three authors appreciate the students in their course at Iowa State University, *Publishing in Biological Sciences Journals*; successful publishing outcomes achieved by these students reinforce to us the value of the methods presented in this book. Thanks are also given to Dr James A. Schrader for his assistance with creating the images found in several chapters and proofreading the entire manuscript. Dr Philip Dixon provided critical review and comments on Chapter 10, and Dr J. Clark Wolf critically reviewed our discussion of ethical issues in publishing in Chapter 3. The American Society for Horticultural Science, and its Director, Michael Neff, generously allowed us to use various publication and reviewers' forms and a society style manual.

PART I

PRELIMINARY CONSIDERATIONS

CHAPTER 1

THE IMPORTANCE OF AND NEED FOR PUBLISHING

We are all apprentices of a craft where no one ever becomes a master.

—Ernest Hemingway

Press on. Nothing in the world can take the place of persistence. Talent will not; nothing is more common than unsuccessful men (women) with talent. Genius will not; unrewarded genius is almost a proverb. Education alone will not; the world is full of educated derelicts. Persistence and determination alone are omnipotent.

—Ray A. Kroc, Founder of McDonalds

DEFINITION AND NEED

The activities of scientists in the search for new knowledge are focused into a sequence of events we call the scientific method. Dissemination of the information discovered by the scientist is the last step in the scientific method, and publication of the information in written form is one of several vehicles for dissemination. This dissemination of these new discoveries in the form of writing may take place in one of several venues, including books, refereed periodicals, or nonrefereed publications (e.g., trade magazines or popular publications). The process of publication, especially

publication of the information in a refereed journal, consists of many activities that must be completed sequentially in a clear and concise manner.

This book focuses on the steps in the process of preparing a manuscript for subsequent submission to a refereed journal in the life sciences. The dissemination of newly discovered information is critical to the advancement of science, and practicing scientists have a duty to complete the scientific method by publishing their information. However, for a variety of reasons, practicing scientists often do not complete this final step in the process efficiently. Science suffers because scientists “reinvent the wheel” when the information they need is locked in the mind or a filing cabinet of someone who has not published important information.

As a practicing scientist, you might start the task of publishing by asking yourself some simple questions. What is it that you enjoy most about being a scientist? How well do you like to communicate your results to other scientists? How well do you like to write? If you are like most of the scientists we have encountered, writing is not what you enjoy most about being a scientist, and the chances are good that you are not particularly eager to write. Often, writing is not on the top-ten list of things that need to be done today, because it is human nature to avoid what we do not enjoy.

For many scientists, the thrilling aspects of science involve developing a hypothesis, conducting experiments, and collaborating with others who can offer new perspectives on and skills for solving the problem at hand. Writing about the research results is well down the list of motivators for many scientists. Yet, writing about our work is essential. And it can be rewarding, perhaps even fun. If you are a practicing scientist not already drawn to the act of writing, then we advise you to learn

about writing and to learn to like it. Although you may find this difficult to imagine, your professional career and advancement will depend almost entirely upon your ability to communicate with other scientists. The better you communicate orally and by written word, the more rewarding will be your career as a scientist. Few activities bring more rewards to the career of a scientist than the act of publishing scholarly work.

The essential unit of publishing for a scientist is the refereed journal article, and all work done by a scientist, even the most preliminary experiments, should be conducted with a mindset that a refereed journal article ultimately will be the result of that work. Our overarching goal in this book is to help you develop the techniques and skills that make publishing in refereed journals as pleasant as possible. Let us begin with some basics regarding the contemporary meaning of publishing in refereed journals.

THE EVOLVING DEFINITION OF PUBLISHING

Decades ago, most scientists did not face the pressure to publish as frequently as they do today. A scientist may have worked for several years to examine an intellectual issue from numerous angles and, eventually, a publication might result, but sometimes there was none. The articles that were published, however, tended to be long and very thorough. The term “monograph” was sometimes used to describe such an article, with the implication that just one (mono) article contained all the known information about the topic.

Today, most scientists in the academic arena are under quite substantial pressure to publish at a greater rate.

Consequently, contemporary journal articles are often shorter and more restricted in their focus, and, in most cases, the article is focused on just one or a few objectives. The quality of the content of the article remains critical, but the ability of a scientist to produce several shorter articles of high quality rather than one longer diatribe is a critical skill that can make or break a research career. Central to the development of this skill is an awareness of the so-called least publishable unit (LPU). The LPU has been described as the minimum amount of information (data) sufficient for a manuscript to be accepted for publication in a reputable, refereed journal (Broad, 1981).

An LPU must support at least one conclusion that your community of scientists (peers) will consider, and this conclusion should have the following features.

- 1.** It should be *original* (the conclusion has never been drawn before).
- 2.** It should be *important* (the conclusion is likely to have some kind of impact).
- 3.** It should be based on research conducted by *using accepted norms of the discipline* (Broad, 1981).

Another evolving aspect of publishing is the ever-increasing array of venues in which you may choose to submit your manuscript. New journals are being developed and brought to publication at a greater rate than historical journals are being discontinued, and this leads to a net gain in the number of journals that might be an avenue for you to publish your manuscript. This represents a wonderful opportunity for you as an author, because you can select the venue that will be most appropriate for your manuscript. It also means that if your manuscript is not accepted by the first choice of journals, there are several other options. Indeed, perseverance is a key trait of successful scientists.

Another related change in the publication process is the mode of review. Nowadays, very few journals conduct reviews by sending each reviewer a hard copy of the manuscript. Most manuscripts are now submitted electronically, and the editorial office of the journal sends the manuscript for review via electronic mail. In turn, the judgment of the reviewers is reported electronically as well. Questions remain as to whether the electronic movement of manuscripts is affecting the quality of reviews, but there is no doubt that reviews can be done more efficiently and rapidly than ever before. Thus, although your manuscript might be released or rejected, the relatively rapid decision leaves you with more time to improve it and pursue revision and resubmission to the same journal or publication in another journal.

WHY PUBLISH?

Before we address this question of why publish, it is important that each of us critically analyzes ourselves to determine our motivation for publishing. There are several very good reasons why you should publish your work, and Peat et al. (2002) have a good discourse on this subject. We summarize their information here.

- 1.** First and foremost, if you have new information, you have an irrevocable duty as a scientist to disseminate that information to other scientists.
- 2.** Publication of research results permits scientists to study those results and use them to advance science, scientific thought processes, and, ultimately, benefit society via practical utilization of these new discoveries.
- 3.** As an extension of no. 2, with help from our current information retrieval systems, it helps your information get out to a broader audience. This is extremely

important, as all disciplines learn from high quality science conducted by people in different disciplines. For instance, many things we know today in plant science have their foundation in animal or medical sciences, and vice versa.

4. Most research today is made possible by funding from many possible entities. These may be large government programs, such as the National Science Foundation, the National Institutes of Health, and so on, state and local sources, and private foundations. It is imperative that you publish the results evolving from the funds the granting agency has invested in your research program.

5. As an extension of no. 4, publications in refereed scientific journals will increase your probability of obtaining continued funding for the same project, or funding to conduct other, related research projects. Success breeds success.

6. Publishing your results can lead to rewards such as promotions and recognitions by professional groups. Publications will strengthen your track record for these promotions and recognitions, and they will add credibility to your dossier. Conversely, not publishing your results can damage an otherwise promising career. Most academic units require a minimum of eight to fifteen publications in refereed scientific journals for promotion (and possible tenure) from one rank to the next highest rank. Likewise, publications add a strong measure of credibility to the entire research team. A publication, or publications, in a refereed scientific journal is the benchmark by which almost all people measure success in research.

7. In virtually every research organization, except perhaps some industries, publication of research results in refereed scientific journals is the

accountability factor used most for decisions affecting the life of that unit.

IN THE END, IT IS REALLY FOR THE SAKE OF SCIENCE

Why is publication so valued? At the simplest level, publications in refereed journals are the vehicles by which science advances, that is, the engine that carries science from one level to the next higher level. Refereed journals represent a repository where, ideally, only new, important, and verifiable data are reported and placed in context. As we will consider later, the referees, your peers, are critical, in fact so critical that the peer review process may frustrate you mightily from time to time. These peers determine the originality, importance, and soundness of your manuscript, and they attempt to “weed out” unoriginal, unimportant, or inadequate work by releasing the manuscript. This release may come in one of two forms. Peer reviewers may release the manuscript but recommend revision and resubmission. On the other hand, one or more of the reviewers may release the manuscript without a recommendation for revision and resubmission. Conversely, the acceptance of your manuscript by peer referees, either as is, or more commonly, with revisions, signifies that your work merits entering the permanent collection of scholarly information on the topic. That collection is available to all other scientists who can use it to shape future research questions and the conduct of future research investigations. Your accepted manuscript thus makes a permanent mark on science and advances our collective state of knowledge. It is a necessary part of science, and also a significant achievement for you, professionally.

We hope it is obvious that you have a responsibility to publish all your work that, at minimum, meets the requirements of the LPU. Publication is essential to science because it is the engine that moves science forward; however, scientists still, sometimes, do not write (Boice and Jones, 1984). It is also essential to you, because it moves you forward professionally. In most instances, only those academic scientists and noncommercial research scientists who demonstrate the ability to publish their data regularly will have stable careers marked by achieving tenure, being promoted, and enjoying a favorable reputation. Publishing skills are critical lessons to learn as early as possible, because those lessons will carry you as far as you can go professionally.

WHY YOU SHOULD BE A GOOD WRITER

High-school students who write well are competitive when seeking entrance to colleges that are highly ranked. Undergraduate students with strong communication skills are recruited actively to become graduate students. A graduate student who has articles accepted during her or his Master of Science degree program will be actively recruited to continue their education and pursue a PhD. PhD graduates with multiple refereed publications are also particularly successful when they search for a postdoctoral, nonacademic professional, or tenure-track faculty position. In addition, a faculty member at a junior academic rank must document their scholarship by publishing in refereed journals, or they will not move to higher ranks (Long et al., 1993).