# On the costs of scientific publishing

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Just over a year ago, I assumed the position of Editor-in-Chief of the *Journal of Biological Chemistry* (JBC). It has been an exciting and rewarding year: We promised to take a close look at JBC's policies and practices to remove pain points for authors and to improve the readability and discoverability of journal content for readers. We engaged the journal leadership and the community of biological chemists at large in order to learn what JBC is doing well and what needs attention. We forged partnerships and made connections with groups at the forefront of scientific publishing to strengthen our vantage point for future innovations. All told, we feel that we made many improvements in the course of a year (1). Most importantly, we feel that we have enriched the ability of JBC both to serve its authors and readers and to facilitate scientific progress, all in partnership with our parent society, the nonprofit American Society for Biochemistry and Molecular Biology (ASBMB) (2).

Now, as we move forward, the issue that has begun to take up an increasing fraction of my mind is the financial landscape for journals and scientific publishing in general and how this landscape will change in the future. JBC is a society-published journal, led by scientists, that works synergistically with ASBMB. Any financial revenue from publishing JBC is poured back into either journal improvements or the activities of the ASBMB, which are in turn deemed by scientists to be important ways to spend funds to improve the scientific landscape broadly (public policy, annual meeting, education, travel stipends, etc.). We are proud of this synergistic relationship and the non-profit publication model it embodies. Nonetheless, we feel that it is incumbent on us as the editorial leadership of JBC to communicate to our authors and readers about what the marketing world calls "the value proposition" for our journal.

As scientists, what are we paying for when we pay the costs of publishing our papers? Is the current financial model an appropriate balance of furthering scientific discovery at costs that do not detract from research progress? Or, have we created, or tacitly endorsed, a model without ensuring that it optimally facilitates scientific advances? This topic has been much discussed for scientific publication in general (see for example, Refs. 3–5), with varying levels of despair expressed about the current model. In most cases, it goes like this: Scientists make a case to funders that they will pursue a significant question, that they have sound and novel ways of answering that question, and that their proposal builds on their record of getting good science accomplished. When the scientists do this well, they receive funding to support their work. Then, the scientists and their teams work vigorously to get exciting and significant results that will stand up to critical review. The scientists then submit their work to publishers who coordinate its peer review, which is carried out by other scientists who carve time out of their busy days to give feedback on the submitted manuscripts. Then, journal editors, who may or may not be practicing scientists (at JBC they ARE), decide on the fate of the submitted paper. If a paper is accepted (in most cases after some revision), the scientists pay out of their hard-won grant funds to have the paper published. In many cases, the authors of the paper also relinquish the copyright to their work, so that later uses of the publication or its component parts return royalties from for-profit entities to the publisher. At JBC, the accepted paper appears on-line as a "paper in press" that can be obtained without cost to the reader. Next, the paper will be "redacted" by the publisher and copy editors to produce a final product that has links, consistent abbreviations, a nice format, and is fully searchable. Next, other scientists must convince their libraries to pay for subscriptions to the journal (or alternatively have their own subscriptions, frequently through society memberships) so that they can read the nicely redacted version of the work while it is fresh. Alternatively, readers may seek out papers that are open access, either due to a blanket journal policy or as an option that authors have selected for a fee. The cycle begins again as readers are inspired by the findings reported in these papers, which stimulate new proposals, and exciting new science is undertaken.

At first blush, this sequence of events seems wrong: Scientists seek public or private funds to pay for the research, then pay to have it published; they relinquish their ownership, and then pay to read the scientific products. It seems at times as though scientists have lost control and are consequently paying for their research multiple times: first to carry it out and then to publish their results. But, we need to look more closely. Many of us (I dare say, most) are ignorant of the costs involved in carrying out each step of the publication process. Here in broad strokes are some aspects of the publication workflow at JBC that cost money:

- Development and ongoing oversight of an on-line submission system.
- Validation of submitted manuscripts, including analysis of figures for proper data presentation.
- Maintenance of editorial leadership to oversee the journal, communicate with authors, and carry out manuscript review, with assistance from journal staff .
- Recruiting and training of editorial board members to facilitate high quality, rapid review.
- Development and ongoing oversight of a web-based system for access to accepted manuscripts (Papers in Press).
- Redaction of accepted manuscripts (validating and enabling links, copy-editing for accuracy and clarity, checking compliance with standard abbreviations, formatting, and layout).
- Development and ongoing oversight of a web-based system for searchable, archived published versions of final manuscripts.

- Handling publication of special content (creating unique landing pages, seeking figure permissions, preparing artwork).
- Preparing cover art.
- Handling business aspects including subscriptions.
- Handling concerns regarding published papers, including managing corrections and retractions.
- Managing communication and collaboration with publishing and society partners.
- Marketing and outreach to facilitate discovery of papers.

This is a long list. And, in fact, it serves only to describe the status quo: maintaining JBC's tradition of rapid and rigorous review, high quality of data presentation, and maintenance of reproducibility and statistical standards. However, as we look toward the future of the journal and scientific publishing more generally, this list will change. For example, enhanced searchability of all published JBC content using state-of-the-art methods like machine-learning and embedded metadata will incur some costs up front and some running costs. But, we are convinced that the ability to find information and to link studies to one another will help science advance. Also, web-based author services will soon replace our preparation of Word and pdf versions of our papers. And, before we know it, web-based publication software will streamline the redaction phase of publishing. JBC and ASBMB are committed to investing in the development of these and other appropriate advances so that authors and readers will reap their benefits down the road. These investments will incur increased costs that get passed on to authors and readers, so it is critical to engage the JBC community in our planning.

With this in mind, we vow to engage in a bipartite exercise: On the one hand, JBC commits to analyzing all costs associated with publishing our journal on an ongoing basis. We will communicate with transparency and accessibility the "value proposition" for JBC: the costs of the publication process, how decisions are made that affect costs for JBC, and how the costs may change in the future. We will make it possible for a scientist to understand why particular charges are what they are.

Simultaneously, the JBC leadership commits to listening to the scientific community it serves about the value scientists put on the different cost-incurring steps in publication. If we are to reduce costs for our authors, what should we cut back? What is important enough to spend more money on? Do we have the value proposition right, and how do we expect it to change over time? We will also keep on top of future opportunities to improve the publication process and the associated costs or savings and to ask what scientists see as the impact of new technologies and processes.

The editors of JBC and the leadership of ASBMB invite you to participate in this exercise in any way you wish. Please let your opinion be known. Let's take control of our destiny in the realm of scientific publication!

## References

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