<http://www.emergtoplifesci.org/>

# Scholarly publishing in the life sciences: the life scientists’ perspective.

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# Introduction

In some ways, the state of scholarly publishing has not changed much in the last ten years. Publishing in a top-tier journal is still perceived as critical for career progression (promotion, gaining grants) by scientists. Likewise, journal metrics continue to dominate in the evalution of a paper’s research, rather than reading the paper itself [Brenner]. However, there are several reasons for optimism that the nature of scientific publishing will improve. Here we outline some recent deveopments in the life sciences.

## Preprints

Since 1991 physicists have heralded the preprint server ArXiv [Ginsparg 2017] as a rapid way of disseminating their research findings. On the surface, it does not provide much beyond a collection of PDFs grouped by topic. In certain fields, being the first to publish on the ArXiv is considered to be the key step, although subsequent journal publication is still the norm. Although ArXiv hosts papers in quantitative biology, it was assumed that biologists would not adopt a preprint culture: publishing a preprint might prevent subsequent publication in a top-tier journal, or leading to scooping by another group.

BiorXiv, launched in 2013, has overcome these concerns. Researchers in diverse areas as ecology, neuroscience, genomics are uploading preprints and choosing to share their work ahead of publication. There are many reasons for this usage:

* Sharing work before submitting to a journal allows for community feedback.
* Sharing work at the time of submission means that the community can read the work months (or years) before the work eventually appears in print.
* Journal editors are browsing the bioRxiv and soliciting that relevant papers be submitted to their journal. (How widespread this is, I’m not sure.)
* BioRxiv preprints can be transferred rapidly to journal submission sytems rather than going through (often lengthy) direct submission to the journal.
* Several funding agencies, including NIH and UKRI, allows preprints to be listed and cited in grant applications.

Several other preprint servers have been created in recent year, in particular [PeerJ Preprints](https://peerj.com/preprints/), [OSF Preprint servers](https://osf.io/preprints/), and [preprints.org](https://preprints.org), although to date BioRxiv is the dominant repository. Unlike a few years ago, very few journals in the life sciences now regard a preprint as prior publication of that work.

## Preregistration studies

According to recent surveys, life scientists across many domains believe there is a “reproducibility crisis” in science: i.e. key findings of a paper have not been independently verified [REF]. An encouraging response to this crisis has been the adoption of preregistratation papers [Nosek 2018]. These papers typically describe the introduction and methods sections of a paper, and are peer-reviewed *before* the study is actually performed. This allows reviewers to improve the study design and commits researchers to hypotheses that they wish to study along with their statistical analysis. Once the pre-registration study is approved, it is then published. After the research is completed, another paper describes the results of the study using the pre-registered methods. (Additional findings can be reported, but are clearly marked as such.) Preregistration is most prevalent today in psychology. The Center for Open Science Preregistration Challenge https://cos.io/prereg/ is helping to popularise this notion more broadly.

## Other recent innovations of note

ORCiD <https://orcid.org> provides a persistent, unique digital identifier for researchers. Many journals now require that at least one author verifies their identity as author using ORCiD [https://orcid.org/content/requiring-orcid-publication-workflows-open-letter].

**DORA** https://sfdora.org/ is a declaration for individiauls and institutions to commit to evaluating research based on its content rather than metrics. Most UK funders have signed, although only a few Universites have signed. See also the Leiden Manifesto for Research Metrics (http://www.leidenmanifesto.org/).

**Published Peer Review Reports**. Many journals now already or have pledged to provide greater transparency about the quality of peer review they provide by publishing the content of the reviewer reports alongside published articles. Notably two large open access publishers PLOS and MDPI are amongst those that are pledging to provide greater transparency from 2019 http://asapbio.org/letter. PubPeer <https://pubpeer.com/> allows reviewers to ‘claim’ metadata records on their profile for peer reviewing and editorial work they have done.

**Post publication peer review**. A journal may immediately publish a paper upon submission; reviews are then sought for the preprint and made public. If sufficient reviewers support publication, the article is formally accepted and e.g. listed on pubmed. Leading examples of this approach are F1000 Research, who provide the infrastructure for several institution- and funder-specific journals, such as *Wellcome Open Research* and *Gates Open Research*.

**Format free submissions**. Journals have traditionally imposed strict formatting requirements for manuscripts before peer review. As editors at top-tier journals ‘desk reject’ most submissions before peer review, this leads to many wasted hours [Budd 2017]. Gradually life science journals are now dropping these formatting requirements for initial submissions, instead allowing “format free” submissions [Khan 2017; see also https://asntech.github.io/format-free-journals/].

**Stronger data sharing policies and community expectations** Both funders and journals are now making stronger statements about what research materials (data, computer programs, reagents) should be shared upon publication of the corresponding articles. Although these policies should increase data availability and reuse, the current compliance rates are quite low [Federer et al 2018]. Given that it can take considerable time and effort (for both researchers and journals) to ensure data is appropriately shared, these low-uptake rates are perhaps expected. To reward authors for this work, “data papers” (a paper that simply describes the data) are becoming more prominent, e.g. in journals like *Scientific Data* and *Gigascience*.

## Funder mandates and compliance

Key Funders in the UK have had policies in place supporting open access for many years. IN particular, the Wellcome Trust has mandated Open Access for publications funded by them since 2006, with sanctions for non-compliance. Compliance rates (around 90%) are highest for the WT, as of October 2017 [Larivière and Sugimoto 2018], with compliance for other main funders varying at 70-90%. Where work has been supported by relevant funding agencies, our experience to date is that funds have always been available to support APCs. However, one of us [SJE] has experienced difficulties in finding APCs for papers summarising work supported by internal, rather than external, funds.

One perhaps unintended consequence of these policies has been that most traditional journals have established a “hybrid” model of publishing, with APCs that on average exceed those in pure OA journals [Pinfield et al 2017]. This hybrid model of publishing has shown little signs to date of disappearing, as e.g. funds from Wellcome Trust have supported high APCs. The success of OA publishing however has meant that goverment-provided funds can often no longer cover all APCs and UK institutions are beginning to restrict the choice of journals for which APCs will be paid. However, The OA publishing world is due to change dramatically in 2020 with the recent announcement of “plan S” [Schiltz 2018], a European initiative to enforce OA, cap APCs and prohibit publishing in hybrid journals. Whilst we support the notions underlying plan S, until further details are released (e.g. the nature of the APC cap, recognition of green and diamond OA).

# Concluding remarks

We have outlined several recent developments that we hope present alternatives to the traditional hierarchy of scholarly publishing. These develpments should help reduce the pressure on early career researchers that they currently face in the “publish or perish” culture. To recognise this pressure, we have created an initiative called *Bullied into Bad Science* (http://bulliedintobadscience.org/). We encourage the adoption of the above open practices to help create a more ethical research environment.

overlay journals?

# Glossary/abbreviations

Perhaps need a list of key abbreviations/terms that are jargon (APCs/hybrid/diamond OA).

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# notes (not for paper)

removed text about overlay journal… BioRxiv can even be used as the substrate for an overlay journal (example?), and we look forward to the creation of prominent diamond OA overlay journals in the life sciences.

**Badges** to promote sharing of resources, rather than just the papers. e.g. mention data papers? (Not sure whether to include this.) (Ross: I’m not that enthused about badges https://blogs.plos.org/absolutely-maybe/2017/08/29/bias-in-open-science-advocacy-the-case-of-article-badges-for-data-sharing/ )

ORCID This will undoubtedly help reduce many types of authorship fraud (cite http://nautil.us/issue/42/fakes/why-fake-data-when-you-can-fake-a-scientist ?)

Crossref can now register DOIs for peer review reports as a distinct content type, and formally link these to the DOIs of the articles they review (https://www.crossref.org/news/2018-06-05-introducing-metadata-for-peer-review/).

Nice figure for preprint usage at: http://www.prepubmed.org/monthly\_stats/