

# The future of academic publishing



Academic publishing is the backbone of science dissemination – but is the current system fit for purpose? We asked a diverse group of scientists to comment on the future of publishing. They discuss systemic issues, challenges, and opportunities, and share their vision for the future.

## We must dismantle access barriers

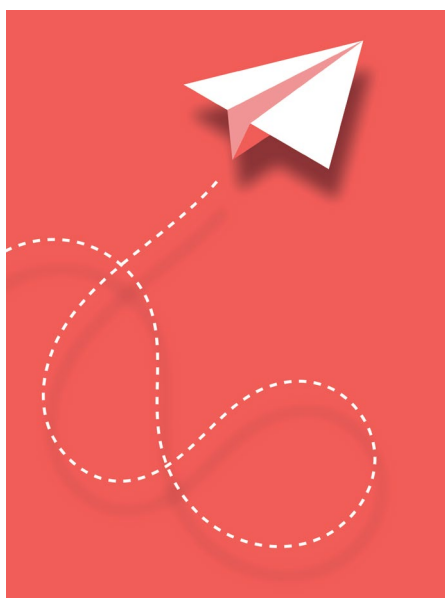
**Humberto Debat.** A large portion of traditional academic publishing is unequal, exclusionary, unsustainable and opaque<sup>1</sup>. Nearly 70% of scientific journal articles are locked behind paywalls<sup>2</sup>. The publishing industry has sequestered and commoditized scientific literature. It is a scandal.

We need improved and accessible scholarly communications for better science. A recent [UNESCO Recommendation](#) defines open science as an inclusive construct: multilingual, open, accessible, transparent, reusable, shareable, collaborative and oriented to benefit society.

Latin America is taking on a pioneering role in this. In Latin America, scientific outputs are considered a public good. Free-to-publish and free-to-read cooperative publishing is supported by non-commercial and publicly funded infrastructure. [Ninety-five per cent of Latin American journals](#) are diamond open access: community-driven and collaborative platforms with no article processing charges. Their example shows us that research is a more global and diverse enterprise than is typically acknowledged. By including diverse voices, they contribute substantially to the academic landscape and the accessibility and dissemination of research<sup>3</sup>. Unfortunately, these journals tend to be excluded by indexing systems, which causes science published outside of the Global North to not receive the attention that it deserves.

Academic institutions globally should support open access through not-for-profit, sustainable, collaborative, scholarly led publishing<sup>4</sup>. Social impact should be the driving force behind science, and research [should be open and aligned](#) with the UN's sustainable development agenda<sup>5</sup>.

In addition, the research assessment system [must evolve](#) to recognize the intrinsic value of research rather than the prestige of the journal in which it is published<sup>6</sup>. Some initiatives, such as Plan S, are encouraging a shift in publishing practices. However, Plan S falls short in addressing the core issues of traditional



scholarly publishing<sup>7</sup> – namely, the unequal distribution of articles among a small number of commercial publishers with exorbitant profit margins<sup>8</sup>. The continued move towards article-processing-charge models could result in a worldwide pay-to-publish system, and make it challenging for researchers from developing nations to disseminate their research<sup>9</sup>.

Finally, communication practices for scientific disciplines may differ but we should all make a firm commitment to multilingualism in scholarly communications<sup>10,11</sup>.

Overall, there have been encouraging developments in the Global South towards more equitable and inclusive scholarly publishing, oriented to the democratization of knowledge. Science is human, all too human. At its core, science is a dialogue. To make it a truly global conversation, we must dismantle numerous barriers, beginning with those related to access, publication and language.

## AI will reshape publication

**Patrick Mineault.** This is an exciting time for artificial intelligence, as large language

models (LLMs) become broadly useful<sup>12</sup>. Many scientists are already using LLMs to enhance their programming and writing. Although current systems such as GPT-4 are limited by their tendency to generate factually incorrect text, this can be mitigated by using retrieval-augmented LLMs that reference external documents and are less prone to factual error<sup>13</sup>. Tools that combine LLMs and scholarly databases, such as [Elicit](#) and [Semantic Scholar](#), are already facilitating literature search.

LLMs make knowledge work faster and cheaper, and I expect science to accelerate as a result. LLMs are multidisciplinary and can translate jargon and methods across disciplines. This could help to bring together far-flung areas of research in novel ways – a key ingredient in high-impact science<sup>14</sup>. LLMs are also tireless: secondary analyses and meta-analyses will be far easier to produce in the future, and this could rapidly lead to advances such as [NeuroSynth](#)<sup>15</sup>. Most radically, LLMs could run experiments on human cognition autonomously, as suggested by the [Autonomous Empirical Research Group](#).

This cheaper, faster and more interesting research will put pressure on the scientific establishment. Our ability to produce science might accelerate faster than our ability to review it and act upon it. Social media are already filled with complaints from editors who cannot find reviewers. LLMs might not end prepublication peer review, but they will accelerate its long decline.

Ultimately, we might be forced to rethink publication. If scientific research is mostly read by machines, the question arises of whether it is relevant to package it into a single coherent narrative that is adapted to the limitations of human cognition. This seems like a lot of busywork for scientists. We could unbundle scientific research from the constraints of journal formatting, as suggested by [Neuro-match Open Publishing](#). In this view, research will be a living compendium of code, datasets, graphs and narrative content – remixable

and always up to date. Open and freely accessible research will be more valuable and influential because it will be seen by LLMs. Traditional publishers will need to adapt their activities to provide value in this new ecosystem.

## Shift from distribution to discovery

**Lisa Janicke Hinchliffe.** For centuries, scholarly journals have served to register, certify, disseminate and preserve the scholarly record through the production of what has come to be known as ‘the version of record’ (the final published version of an article). Until recently, there were few major challenges to any of these roles. Print production, copyright transfer from author to publisher, and the policy and practice that a given manuscript should only be published once and should only be submitted to one journal at a time created a situation of constraint – some might even say control or monopoly. And, of course, the primacy of the version of record in the academic evaluation and reward system furthered the value provided by scholarly journals.

All of the purposes of the scholarly journal are currently under pressure and the conditions that allowed journal publishers to influence and direct scholarly communications practices are no more. Most journals have no print version, the pendulum is swinging from copyright transfer to copyright retention and, with preprints, we are heading into a world in which every article is published online at least once before it is published as a version of record. Journals do still register, certify, disseminate and preserve; however, they no longer do so exclusively. The question emerging is whether journals are needed at all, given the rise of other processes and platforms.

Emergent from this time of transformation and pressure will be, I believe, a reconceptualization of the dissemination function, as it is increasingly obvious that distribution is necessary but not sufficient to ensure readership and article use. To maintain their value in the academic evaluation and reward system, journals need to ensure articles are not only published but also consumed.

The coming shift – which is admittedly already underway in certain sectors – will recentre dissemination from distribution to discovery. Efforts by publishers to syndicate content to ResearchGate and ScienceDirect are harbingers of the coming focus on discovery. It can no longer be assumed that a work will find its audience – even works that are published open access. Instead, publishers will have to shift resources from production

to ensuring discovery of what is published, investing in robust metadata, content syndication and expanded programmes of use tracking and analytics. The danger here is that discovery efforts will tip into hype-marketing, although any journal that does so will probably risk its reputation for intellectual integrity. Through a focus on discovery, scholarly journals should be able to counter the pressures that lead some to believe their demise is imminent and to reestablish their role as a central actor in scientific communication.

## Decolonize publishing

**Yap Boum II.** There is no reason to light a lamp and hide it. Yet, researchers from the Global South produce research outcomes that remain unseen at the local and international level owing to the challenges they face. There is a lack of recognition of the key roles of Global South researchers by their counterparts from the Global North, including the scientific contribution that they provide to implement and disseminate research. Therefore, they are stuck in the middle of authorship lists or they do not appear at all. The reasons for this are numerous and more equity is needed.

First, Global South scholars often do not hold the research agenda and are in many places implementors of the research to which they contribute<sup>16</sup>. In such cases, the articles are written by their Global North collaborators and their contribution is lost amidst many author names. Second, language is a real barrier – especially for researchers in francophone Africa<sup>17</sup>. Although the results of their research could be of importance, they cannot publish them in major journals that are read by policymakers. Such journals in most cases publish articles in English – therefore reinforcing the foreign gaze, in which research outcomes are written for an international audience<sup>18</sup>. Finally, scientific skills for writing grants and publications are heterogenous in the Global South, owing to lack of training, mentorship and opportunities to gain this knowledge (especially in francophone countries).

To address these challenges there is a need for the publishing industry to offer publication in any language desired by researchers, with proper editing<sup>19</sup>. Organizations involved in global health should lead training and mentoring programmes to strengthen scientific communication. It should become standard practice that researchers sign a common understanding before starting any partnership<sup>20</sup>. The research community would benefit from establishing a novel digital platform

that could use artificial intelligence to match scientists globally based on their needs and the resources available. Scientists who are matched on this platform can then create new collaborations at the individual (for example, mentorship or coaching) or the institutional (for example, partnership or funding) level. It will break barriers and enable researchers from the Global South to tell their story. Finally, international publishers should support and empower local scientific journals by providing funding support to cover article processing charges and training opportunities as well as highlighting the research they publish.

These solutions will motivate Global South scientists to express themselves in their language and implement homegrown solutions from their research. For health researchers specifically, this will help them to address their local health challenges while decolonizing global health.

This contribution was edited in English, with a French translation provided by the author (Box 1). The translation was not checked for correctness by Springer Nature.

## Preprints can improve publishing

**Charlotte R. Pennington.** Publications are academic currency; they provide a means to advance knowledge and enhance researchers’ careers. In recent years, concerns regarding academic publishing have increased exponentially. These include publication bias<sup>21</sup>, the profitability of publishing houses<sup>22</sup>, inequality in research access<sup>23</sup>, the voluntary labour of peer review and its associated quality<sup>24,25</sup>, the disconnect between journal prestige and research reliability<sup>26</sup>, predatory journals<sup>27</sup>, poor error correction<sup>28</sup> and inconsistent policies and procedures<sup>29</sup>.

Harnessing the utility of preprints may solve many of these issues in academic publishing. Preprints are defined broadly as research documents that are made freely available via a public server (for example, [arXiv](#) or [PsyArXiv](#)) before publication in a journal. They accelerate dissemination of research, allow researchers to gain early feedback, and increase access. With many of the concerns surrounding their use unfounded (for example, scooping<sup>30,31</sup>), preprints can reduce publication bias by permitting researchers to deposit their work regardless of its publication ‘success’. Through not-for-profit preprint servers (financially supported through institutions, organizations or donations), preprints fulfil the criteria of green open access and are detached from the typically large profit margins of gold

## BOX 1

### French translation of the ‘Decolonize publishing’ section by Y.B. II

#### Décoloniser la publication scientifique

Il n’y a aucune raison d’allumer une lampe et de la cacher. Pourtant, les chercheurs du Sud produisent des résultats de recherche qui restent invisibles au niveau local et international en raison des défis auxquels ils sont confrontés. Il y a un manque de reconnaissance des rôles clés des chercheurs du Sud par leurs homologues du Nord, y compris la contribution scientifique qu’ils apportent pour mettre en œuvre et diffuser la recherche. Par conséquent, ils sont coincés au milieu des listes d’auteurs ou n’apparaissent pas du tout. Les raisons sont multiples et il faut plus d’équité.

Premièrement, les chercheurs du sud ne sont pas responsables des programmes de recherche et sont, dans de nombreux cas, les exécutants de la recherche à laquelle ils contribuent<sup>16</sup>. Dans de tels cas, les articles sont écrits par leurs collaborateurs du Nord et leur contribution se perd parmi de nombreux noms d’auteurs. Deuxièmement, la langue est un véritable obstacle, en particulier pour les chercheurs d’Afrique francophone<sup>17</sup>. Bien que les résultats de

leurs recherches puissent être importants, ils ne peuvent pas les publier dans les grandes revues lues par les décideurs politiques. Ces revues publient dans la plupart du temps des articles en anglais, renforçant ainsi le « regard étranger » dans lequel les résultats de la recherche sont écrits pour un public international<sup>18</sup>. Enfin, les compétences scientifiques pour la rédaction de demande de financement et de publications sont hétérogènes dans les pays du Sud, en raison du manque de formation, de mentorat et d’opportunités d’acquies ces connaissances, en particulier dans les pays francophones.

Pour relever ces défis, il est nécessaire que l’industrie de l’édition propose des publications dans toutes les langues souhaitées par les chercheurs avec une édition appropriée<sup>19</sup>. Les organisations impliquées dans la santé mondiale mènent des programmes de formation et de mentorat pour renforcer la communication scientifique, les chercheurs signent des accords équitables de collaboration commune avant de commencer tout

partenariat<sup>20</sup>, la communauté de chercheurs en santé globale crée une nouvelle plateforme digitale qui pourrait utiliser l’intelligence artificielle pour mettre en relation les scientifiques du monde entier en fonction de leurs besoins et des ressources disponibles. Les scientifiques appariés sur cette plateforme pourront ainsi créer de nouvelles collaborations au niveau individuel (mentorat, coaching) ou institutionnel (partenariat, financement). Cela brisera les barrières et permettra aux chercheurs du Sud de raconter leur histoire. Enfin les éditeurs internationaux devraient soutenir et responsabiliser les revues scientifiques locales en offrant des opportunités de financement et de formation ainsi qu’en mettant en valeur les recherches qu’ils publient.

Ces solutions motiveront les scientifiques du Sud à s’exprimer dans leur langue et à mettre en œuvre des solutions locales issues de leurs recherches. Pour les chercheurs en santé globale, cela les aidera à trouver des solutions innovantes pour relever les défis locaux tout en décolonisant la santé globale.

open access publishing (via article processing charges to authors<sup>32</sup>) or subscription fees to readers. From this perspective, preprints can also create a more equitable and diverse research landscape, aiding better access and discoverability of research for those in developing countries (for example, [AfriArXiv](#) – although additional support for such preprint servers is required<sup>33</sup>). Ranking systems do not exist: each preprint server is aligned with its discipline and quality control maintained through version tracking, moderation and community feedback (including error detection)<sup>34</sup>. Services such as [Review Commons](#) and [Peer Community In \(PCI\)](#) offer a platform for independent peer review of preprints, facilitating author-directed submission of refereed preprints to affiliate journals. Such in-house oversight protects the community from predatory journals and ensures homogeneous policies and procedures. Furthermore, the offshoot [PCI Registered Reports](#) promotes rigour, reproducibility and replication by reviewing and recommending Registered Reports preprints<sup>35</sup>.

Problems associated with academic publishing signal a strong incentive for change. Preprints can mitigate many of these concerns by reimagining traditional publication and research evaluation processes and progressing to a more equitable, open access future. Journals should not see preprint servers as a threat but rather an aide to an improved research landscape.

#### Eliminate peer review

**J. Andrew Pruszynski.** The preprint revolution has largely been won. Victory has secured fast and free access to much of the scientific literature. In many laboratories (including my own), the preprint is what is generally consumed, and the eventual journal version yields little more than a passing scan and an update to the citation manager. This new reality puts into sharp relief the nature of traditional peer review – an erratic and often perfunctory process that tends to improve papers without fundamentally altering them.

We should consider the idea that most papers do not need traditional peer review.

Most of the work that we do is incremental, furthering established ideas based on standard experimental and analytical approaches. These papers do not make large outward-facing claims and fit into a broader literature that provides natural constraints, and the readers are generally experts who can make their own judgments. To the degree that feedback is required, comments on the preprint seem sufficient and would probably increase if traditional peer review was rare.

Not subjecting most papers to traditional peer review would save substantial resources: author and reviewer time, but also funder money. The savings could be invested in more science but also more rigorous ‘peer validation’ of preprints that introduce new ideas and approaches or begin to garner substantial influence. In practice, peer validation would mean reviewing the claims but also reanalysing the raw data, scrutinizing and rerunning the original code, and perhaps even running confirmatory experiments. Funders and journals would have to incentivize peer validation because, although rare, the effort would be

substantial. Preprints would also need to adapt to include open data and code from the outset, as validation could happen years later.

Such a shift, from universal peer review to rare peer validation, fits with a growing desire to change how scientific productivity and impact are evaluated. Peer validation would be an achievement for authors, showing that their work is robust and impactful. Peer validation would itself become a valued scientific contribution for reviewers. Journals would be judged not only by citations but also on the quality of their validation. To some degree this shift is starting, with some journals advertising their review process – rather than the outcome – by attaching reviewer comments and author rebuttals to the manuscripts that they publish.

## Address global inequalities

**Alonso Gurmendi Dunkelberg.** As a Global South scholar, I have published about the Global South and from the Global South – but in Global North journals. This is a process that is filled with unacknowledged inequalities that affect the entire publication cycle from research design to publication. Any discussion about the future of academic publishing needs to be aware of these and propose strategies to address them.

Problems start from the earliest stages of research design. The first issue is that of access and local impact. Global South academics write in the Global North because it is good for their careers. But writing in a language that is not spoken by those who need to read the paper limits its real-world impact. Similarly, Global North journals often expect Global South papers to tackle regional trends, and not niche domestic discussions about so-called small, developing nations.

During research, Global South scholars are often unable to access cutting-edge research because of paywalls. Global South universities have to carefully manage limited resources and decide to which databases they subscribe. A lack of open access policies means Global South scholars can be rejected by Global North journals for not engaging with literature to which they have no access.

Once published, it can be extremely difficult to secure permission to translate and republish these works in the Global South. Gatekeeping by publishers who are wary of losing readers to competing, more-accessible local language editions leads to overly bureaucratic procedures and, even when translation is allowed, protracted delays that reduce a piece's timeliness and impact.

All of these inequalities need to be acknowledged and addressed by Global North publishers if the future of academia is to be a more inclusive and diverse one. But remedying what is already broken is only the beginning. Global North publishers need to take active steps to create spaces for the Global South within their internal processes. Including Global South academics in editorial boards is essential. Similarly, journal editors should find non-English leading scholarship, translate it and publish it in the Global North (this, in fact, is something Global South journals often try to do in the reverse, by translating English scholarship into their languages).

Academic research is, by necessity, global. Academic publishing should be too.

## We need more geographic diversity

**Frith Jarrad.** The demand is growing for scientific publishing to become more open, transparent, diverse, equitable and inclusive. However, the international literature is dominated by authors in higher-income countries<sup>36</sup>. This imbalance has the potential to cause substantial harm to conservation science and practice as many lower-income countries have high biodiversity and also face substantial threats such as habitat loss. Costs to publish can be prohibitive. Language is another barrier, along with limited access to research collaborations, which can decrease the participation and subsequent authorship of local relevant researchers<sup>37</sup>. Authors in the Global South might submit less and suffer greater rejection rates relative to Global North authors. Thus, as stakeholders in academia, our challenge is to level the playing field and close the gap in publication success.

Equity of access to publication in scientific journals is key to authorship diversity. Journal editors should know where biases and barriers to publication exist and journals should adopt policies and practices to help to reduce those that they can. Double- or triple-blind review can help to address unconscious and unacceptable biases that may arise during the review process. The geographical location of the author, for instance, should not affect the likelihood of being published.

As journal editors, we should diversify our editorial boards to be representative in terms of geography. This provides breadth, contextually and culturally, to editorial decisions. Journals should publish abstracts or whole articles in multiple, or author-selected, languages to enable findings to reach both greater and local audiences. Journals should offer authors mentoring by experienced

scientists and provide free language editing to non-English speaking authors, which should include writing style and manuscript construction. Journals should also offer publication fee waivers for those who are unable to pay, which may increase the likelihood of worthy papers being published by authors in developing and non-English-speaking countries. Journal editors should further encourage inclusivity by asking authors to provide appropriate authorship contributions and acknowledgement to local collaborators. Some journals already have some of these practices in place.

However, each of these is only a partial remedy. Long-term solutions involve institutions, research communities, funding environments and broader society, to promote constructive interregional collaborations and resolve publishing-related funding inequalities between regions.

## Fight fraudulent publishing

**Aceil Al-Khatib.** Academic publishing faces many challenges; inefficient and biased peer review<sup>38</sup>, the privatization of publicly funded research<sup>39</sup> and the 'publish or perish' culture that has been imposed on academics.

Exploiting the publish or perish culture has resulted in the emergence of a pay-to-publish culture and contributed to surges in fraudulent publishing (also known as predatory or deceptive publishing). This is unfortunately supported by researchers from around the world who publish in predatory journals (that is, journals that use deception). The reasons for this include unawareness, the experience of social identity threat and the intention to publish quickly with the least effort and cost<sup>40</sup>.

Fraudulent publishing is increasingly becoming a problem<sup>41</sup>. It is thus important to critically assess its extent, to act and to collectively face the challenge with a concerted effort by decision-makers at all levels.

At the macro-level, governments who have the authority to regulate, allocate and track resources, can and should issue guidance on responsible research assessment (that is, using an equitable approach in research assessment, rather than using journal-based metrics; for example, the [Responsible Research Assessment](#) of the Global Research Council or the [Declaration on Research Assessment](#)), enact laws and impose penalties on any involvement with fraudulent publishing. To deter fraudulent publishing economically, funding bodies should decide to whom and how much should be spent on publishing research.

At the meso-level, universities should investigate how researchers make publishing

decisions with the aim to encourage responsible research assessment practices. Universities should also provide training on research ethics as well as amend promotion and tenure policies to incentivize and promote honest behaviour. Instead of focusing solely on research output, researcher performance should be measured based on the quality and impact of research and on involvement with research processes such as reviewing and mentoring research.

At the micro-level, researchers should consider the serious consequences of their involvement with fraudulent publishing, which include wasting resources<sup>42</sup>, 'lost science'<sup>43</sup> and citations (owing to a lack of archiving and indexing), as well as reputational damage.

Fraudulent publishing must be avoided. It is not sustainable and harms both research and researchers. We urgently need a reform of the current research assessment system<sup>44</sup> to ensure that fraudulent publishing becomes a problem of the past.

## Editors and reviewers need to do better

**Abubakari Ahmed.** As an early-career researcher in Africa, I am frustrated by the pressure of publish or perish culture and a lack of mentorship. However, my biggest frustrations in academic publishing come from journal editors and reviewers. Some journals do not have a clearly defined scope and waiting several months to receive a desk rejection based on scope is painful. These instances give the impression of gatekeeping and suggest that journal space is reserved for known authors at the expense of authors based in the Global South. Even more frustrating than the long delays in the review process are unpleasant or dehumanizing peer review comments. Who reviews the comments of the reviewers? Editors need to check the comments in detail before sending them to authors. Reviewers increasingly provide language edits and impose their style preferences on authors, rather than providing constructive comments.

The future of academic publishing should include improving the geographical diversity of handling editors who are familiar with different research contexts and appointing early-career researchers on editorial boards. Sometimes, handling editors need a basic knowledge of geographical context to judge whether reviewer comments are constructive. There is a need to adopt a strict policy on publication duration to reduce risk of unnecessary delays: for example, a 20-day policy for the first decision on whether a manuscript is desk-rejected or qualifies for review. If the

journal does not make a decision in this time, the author should be automatically notified that they have the option to withdraw and submit the manuscript to a different journal. Once the manuscript moves to review stage, a 60-day policy should be applied to the time taken to communicate the next decision to the author. If the journal fails to communicate in this time, the author can decide to withdraw their manuscript and submit elsewhere. We need a novel approach to calculate journal impact that takes into consideration long delays in the publication process (that is, average time to publication per article). Such a system must come with better incentives for peer reviewers, such as waivers for open access publication, book purchases or yearly royalties that can be used for research and not personal financial gains.

## Be brave and tell the truth

**Adam Mastroianni.** Scientists used to talk to each other in all sorts of ways: letters, pamphlets, magazines, public lectures, proceedings of scientific societies and a vibrant hodgepodge of journals that operated under different policies and pursued different ends. Prepublication peer review was rare and informal – only one of Einstein's papers was ever peer reviewed, and he was so surprised and upset that [he pulled the paper and published it elsewhere](#).

Over the past generation, scientific publishing has become a monoculture. Every scientist now seeks to publish their work in a peer-reviewed journal and journals seek to increase their impact factors. Publishing papers is now synonymous with seeking status.

Monocultures are vulnerable to viruses and prone to collapse, and that is exactly what is happening to science. Taxpayers fund our work but journals paywall it and reap the revenue. The costs of universal prepublication peer review are extraordinary<sup>24</sup> but the benefits are dubious: reviewers miss most of the errors in papers<sup>45–47</sup> and fail to catch even the most [brazen fraud](#). Many of the findings that pass peer review do not replicate<sup>48–50</sup> and most of them may in fact be false<sup>51</sup>. The artificial scarcity of opportunities to publish causes publication bias, which distorts our sense of what is true and what is not<sup>52</sup>. Unsurprisingly, scientific progress seems to have stalled<sup>53</sup>.

We can reverse these trends if we treat publishing as a way of sharing knowledge rather than as a way of gaining status. Here is one way to do it: publish your research on the internet, directly to the public. Write your papers in normal words so that anyone can read them.

Post all the data, code and materials. Above all, tell the truth.

When I do this on my [blog](#), I get more engagement and better feedback than when I published in journals. I reach people who do not have access to paywalled publications or knowledge of the jargon inside. This is merely one way of restoring some of the scientific diversity we once enjoyed; I look forward to seeing more.

In our hearts, all of us know how we would pursue truth if we did not have to pursue status as well. The only question is: are we brave enough to do it?

**Abubakari Ahmed**<sup>1</sup>, **Aceil Al-Khatib**<sup>2</sup>, **Yap Boum Il**<sup>3,4</sup>, **Humberto Debat**<sup>5</sup>, **Alonso Gurmendi Dunkelberg**<sup>6</sup>, **Lisa Janicke Hinchliffe**<sup>7</sup>, **Frith Jarrad**<sup>8</sup>, **Adam Mastroianni**<sup>9</sup>, **Patrick Mineault**<sup>10</sup>, **Charlotte R. Pennington**<sup>11</sup> & **J. Andrew Pruszynski**<sup>12</sup>

<sup>1</sup>Department of Urban Design and Infrastructure Studies, SD Dombu University of Business and Integrated Development Studies, Wa, Ghana. <sup>2</sup>Faculty of Dentistry, Jordan University of Science and Technology, Irbid, Jordan. <sup>3</sup>Institut Pasteur de Bangui, 9HFF+GFH, Bangui, Central African Republic. <sup>4</sup>Faculty of Medicine and Biomedical Science, University of Yaoundé I, Yaoundé, Cameroon.

<sup>5</sup>Instituto de Patología Vegetal – Centro de Investigaciones Agropecuarias – Instituto Nacional de Tecnología Agropecuaria (IPAVE-CIAP-INTA), Córdoba, Argentina.

<sup>6</sup>Department of Politics and International Relations, University of Oxford, Oxford, UK. <sup>7</sup>University Library, University of Illinois at Urbana-Champaign, Urbana, IL, USA. <sup>8</sup>Conservation Biology, Society for Conservation Biology, Melbourne, Victoria, Australia. <sup>9</sup>Independent scholar. <sup>10</sup>xcorr consulting inc., Montréal, Quebec, Canada.

<sup>11</sup>School of Psychology, Aston University, Birmingham, UK. <sup>12</sup>Department of Physiology and Pharmacology, Western University, London, Ontario, Canada.

✉ e-mail: [abukson1987@gmail.com](mailto:abukson1987@gmail.com);

[aceil@just.edu.jo](mailto:aceil@just.edu.jo);

[yap.boum2@pasteur-bangui.cf](mailto:yap.boum2@pasteur-bangui.cf);

[debat.humberto@inta.gob.ar](mailto:debat.humberto@inta.gob.ar);

[alonso.gurmendi@politics.ox.ac.uk](mailto:alonso.gurmendi@politics.ox.ac.uk);

[ljanicke@illinois.edu](mailto:ljanicke@illinois.edu); [fjarrad@conbio.org](mailto:fjarrad@conbio.org);

[adam.m.mastroianni@gmail.com](mailto:adam.m.mastroianni@gmail.com);

[patrick.mineault@gmail.com](mailto:patrick.mineault@gmail.com);

[c.pennington@aston.ac.uk](mailto:c.pennington@aston.ac.uk);

[andrew.pruszynski@uwo.ca](mailto:andrew.pruszynski@uwo.ca)

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## Competing interests

A.M. is the author of Experimental History, a blog with science that includes both free and subscription content. P.M. owns all equity in xcorr consulting inc. He was the founding CTO of Neuromatch, a 501(c)3 non-profit, and remains in an advisory role. C.R.P. is a ‘Recommender’ for Peer Community In Registered Reports. The other authors declare no competing interests.