A New Arena for Science

The viability of science rests on results – and these should be freely accessible. Reduced to a common denominator, this is what the term "Open Access" implies. But this form of publishing is still far from being the norm in the world of science. Our authors urge politicians and research institutions to pave the way and proactively contribute to changing attitudes.

TEXT **CHRIS BIRD** AND **DAVID CARR**

Although the Open Access movement is now more than 20 years old, it is a relatively recent development in the context of scientific publishing. Since its dawn in 1665, when the Royal Society published the first edition of its Philosophical Transactions, scientific publishing has had at its heart a fundamental compact between the research community and publishers.

In return for having their work widely disseminated among their peers and for the intrinsic rewards that flow from this in terms of their status and professional reputation in their field, scientists have been prepared to forego any form of payment, as well as the rights typically afforded to authors via copyright. In addition, scientists have also been prepared to peer review the work of others as an unpaid service to the broader research community to help ensure the integrity and quality of the scientific record.

The authors declined remuneration and waived copyrights

In traditional models of scientific publishing, publishers seek to recoup the costs of producing and distributing papers, including the management of peer review, by charging fees to readers and libraries to access their journals.

This process functioned relatively well for more than three centuries, but by the 1990s, serious questions had started to emerge as to whether the best interests of the scientific community were still being served. Two major drivers were particularly significant in this regard: first, the emergence of the Internet made it possible to rapidly disseminate research in completely new ways and at a vastly reduced cost, removing the previous reliance on print-based publication. Second, research funders and institutions were paying publishers increasingly higher subscription fees to access research outputs that were at least partially supported by their own funding and resources, and commercial publishers were generating ever-increasing profits as a result.

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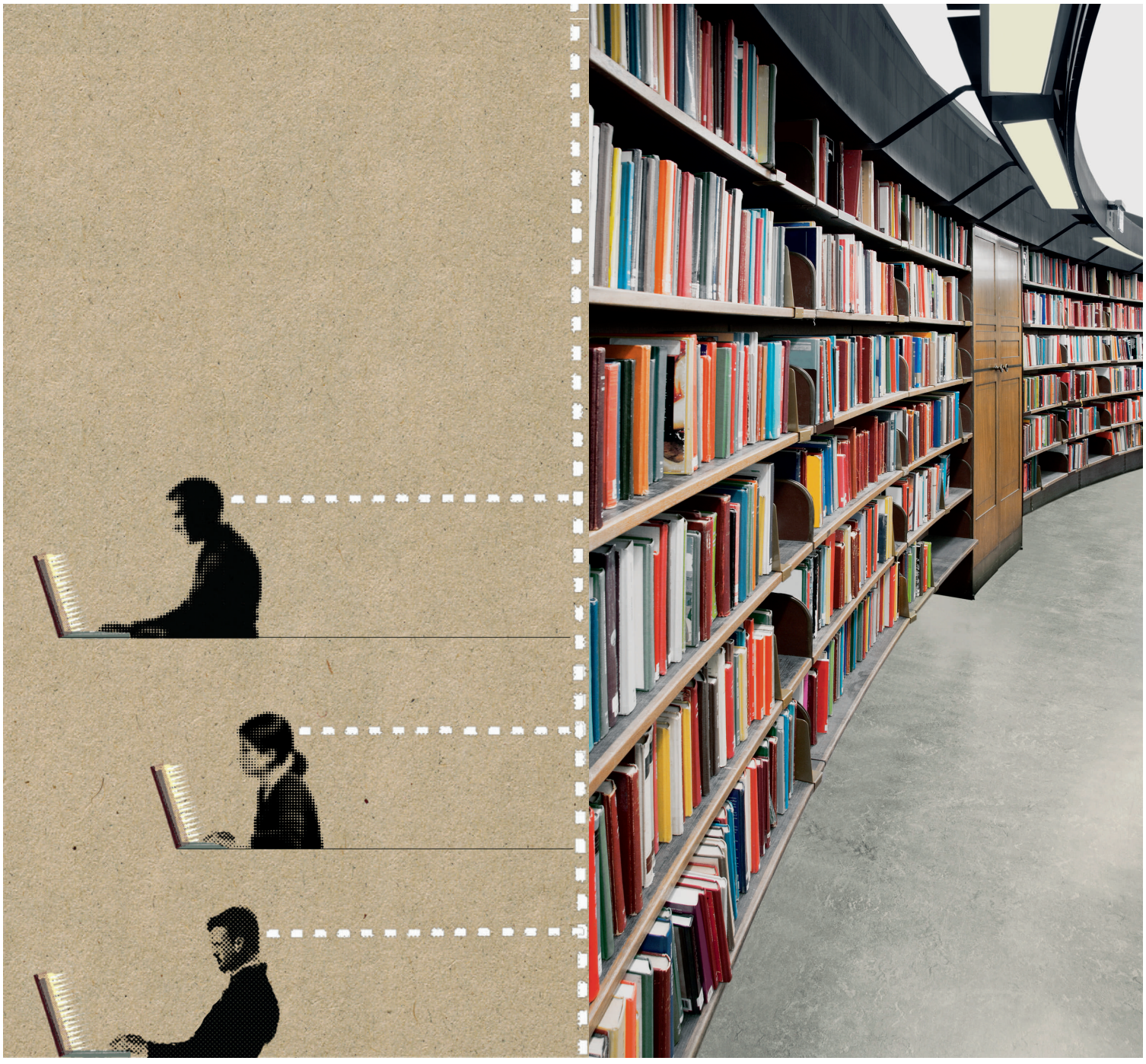

These factors led to the development of new publishing approaches that sought to utilize the power of the Internet to make scientific information freely available to all. This culminated in the early 2000s with the launch of the PubMed Central repository, the Public Library of Science (PLOS) and Biomed Central.

A series of influential statements and declarations in support of Open Access followed – including the Budapest initiative in 2002, the Bethesda statement in 2003 and the Berlin Declaration later the same year. The Berlin Declaration was the outcome of the Max Planck Society's first Berlin meeting on Open Access, and the annual Berlin meeting has since become the premier international open access policy forum.

As the Open Access movement grew, two main established routes developed through which scientific papers can be made available in Open Access form – commonly referred to as the "gold" and "green" models. Under gold Open Access, the publisher makes the paper freely accessible immediately on publication in return for a fee paid by the author, and attaches a suitable license to enable the content to be reused, subject to appropriate acknowledgment and citation of the author. In green Open Access, no fee is paid, but the author is generally permitted by the publisher to self-archive a copy of the accepted (rather than the final, published) version of the article in a public repository after an embargo period, usually six months or a year. In this model, users are typically not granted the types of reuse rights that are permitted under the gold model, such as the right to conduct text mining.

Many new Open Access publishers entered the stage in rapid succession over the past years

Recent years have seen the emergence of many new Open Access publishers – particularly PLOS and BioMed Central, whose gold Open Access-based business models prove that this approach is commercially viable. Their success is reflected in the increasing numbers of traditional scientific publishers that try to emulate the concept by launching their own fully Open Access titles.

Furthermore, an increasing number of funding agencies are establishing Open Access mandates for their funded research. The UK-based Wellcome Trust – a global charitable foundation dedicated to achieving major improvements in human and animal health by supporting the brightest researchers in the biomedical sciences and medical humanities – has had one of the longest-standing policies of this type. The Wellcome Trust is fundamentally committed to ensuring that the outputs of the research it supports – including research publications and data – can be accessed and used as widely as possible, in order to maximize the public benefit resulting from its funding.

The Wellcome Trust Open Access guidelines were set out in 2005. Since then, all funding awards are subject to the condition that all articles funded in whole or in part by the Trust be freely accessible in the PubMed Central (PMC) and the Europe PubMed Central (Europe PMC) repositories as soon as possible, but no later than six months following their publication. Researchers receive dedicated funding for costs incurred for publishing through the Open Access model.

Wellcome provides block grants to around 30 UK universities to cover processing fees for articles produced by Trust-funded researchers, and Open Access costs incurred by researchers based at other institutions are covered through grant supplements.

Moreover, the Wellcome Trust developed UK PubMed Central as the central repository for full-text access to publications. There are currently 19 partner

funders, the most recent addition being the European Research Council, which earlier this year became the third non-UK-based funder, alongside the Austrian Science Fund (FWF) and the Telethon Foundation in Italy. UKPMC changed its name to Europe PMC as of November 1, 2012.

Researchers have accepted the Open Access policies of the Wellcome Trust, and just over half of the papers generated by its funding are now freely accessible. This past June, it announced further measures to strengthen its policies; for instance, through withholding final grant payments until the researcher's institution confirms that all publications are compliant with the policy.

Finally, Wellcome Trust will introduce a requirement from April 2013 that, where the Trust has paid an Open Access fee, the publisher must provide license for unrestricted commercial and non-commercial reuse. This will be implemented through a Creative Commons attribution license, which has become firmly established as the gold standard for Open Access.

Open Access is being more widely supported in political circles, as well, with the UK Government, for instance, having taken it up as part of its open data agenda. The goal is to tap the commercial and social value of data developed by the public sector for the benefit of the general public. Last year, the UK Government established an independent group of experts chaired by Dame Janet Finch to examine how to expand access to scientific publications.

The group published its report in June 2012, and the Government has accepted its key recommendation, that the UK should set a clear policy direction toward ensuring that publicly funded research findings are published in Open Access form.

In parallel with the Finch report, the UK Research Councils published an updated Open Access policy requiring that any research they fund be made freely available within six months of publication – with exceptions currently being made for the humanities and social sciences. It also announced the establishment of new institutional funds to cover the costs of Open Access. The UK Research Councils will also require a Creative Commons attribution license whenever they pay an Open Access fee, just as the Wellcome Trust does. Together, we are currently working to persuade publishers to implement this requirement.

> More than 10,000 scientists from all over the world signed an online petition to boycott the publisher

The EU Commission, too, has indicated that it strongly supports Open Access. A communication published in July 2012 established Open Access via the gold or green route as a general principle in the "Horizon 2020" program, and the EU Commission continues to reimburse Open Access fees. The accompanying recommendation for Member States encourages national bodies to define clear policies for Open Access to scientific publications resulting from publicly funded research.

These developments followed in the wake of the Research Works Act having failed to obtain congressional approval in the United States. This draft legislation would have reversed the current Open Access strategy of the National Institutes of Health (the American health authorities). Initial support by the Elsevier publishing group for the Act provoked an intense reaction: more than 10,000 scientists from all over the world signed an online petition to boycott the publisher.

Despite the growing support for Open Access, there are still some obstacles to overcome. At present, depending on subject area, only 10 to 15 percent of all scientific articles are freely accessible. Similarly, there are currently very few recognized Open Access

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avenues available for scientists with groundbreaking research findings to publish their work in leading scientific journals.

That was one of the main motives for the Wellcome Trust, in conjunction with the Max Planck Society and the Howard Hughes Medical Institute, in launching eLife. This new online life sciences journal will focus on publishing exceptional work from all areas of biology and medicine.

At present, researchers who want to publish in leading journals often face huge obstacles. In particular, there is an impression that the peer review process can be excessively protracted – with several revisions of a contribution often required before it is finally accepted and published. From the outset, therefore, a key goal of eLife was to develop for the journal an editorial process that was simultaneously fair, swift and efficient, and that would stimulate change in the wider publishing sector. In addition, eLife will seek to unleash the potential of online publication to enhance the presentation and readability of research papers.

> All editorial decisions will be made by leading scientists currently active in research

eLife was officially founded in June 2011, and began accepting contributions in June 2012. Online availability will commence at the close of this year. At its core, eLife is a scientific journal run by scientists, for scientists. All editorial decisions will be made by leading scientists who are currently active in research.

It will seek to publish the most influential and significant new research findings across the full spectrum of the life and biomedical sciences, from developmental biology to clinical research. The definition of "significant" is meant to be interpreted broadly. A published article can deal with fundamental knowledge in biology, a brilliant new method or a pioneering clinical application.

A key innovation in the review process that eLife will introduce is that, after peer review reports have been submitted, editors and reviewers will consult with one another to reach consensus on the key strengths and weaknesses of the work. Based on this discussion, the editor will send the author a summary of the key points the author needs to address. In turn, the editor will normally be able to decide whether the edited manuscript is ready for publication. The overall goal will be a clearer, more constructive process that considerably reduces the time required from submission to acceptance.

The funders have agreed to absorb all costs of eLife during a startup phase of at least three years. This means that authors will not be charged any publication fees whatsoever during that period. Over the long term, the journal will be converted over to a sustainable finance model.

The launch of eLife is one of the most important milestones in what has been a momentous twelve months for the Open Access movement. We firmly believe that the development toward Open Access is now unstoppable, and that the scientific publishing sector will undergo a wholesale shift to the gold Open Access model over the next decade. Public and private research funders should work proactively and in partnership to accelerate this transition.

As a first step, all research funding institutions should develop and implement clear policy mandates in support of Open Access. Following the recent recommendation of the European Commission, we are optimistic that Germany and other nations will set clear policy guidelines to ensure that taxpayer-funded research is Open Access.

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In supporting Open Access, it is vital for funders to recognize that publication has a cost and that this cost needs to be met. The Wellcome Trust's view has always been that the cost of dissemination is an integral part of the cost of research. Funders must thus ensure that scientists have the financial means available that they need for publishing their work under the Open Access model.

> Funders and institutions must work together closely to keep the costs low

The above-mentioned Finch report generated considerable discussion in the UK, particularly in relation to estimates that the transition to Open Access may cost the UK research sector an additional 62.5 to 75 million euros (between 50 million and 60 million British pounds) per year during the period of a mixed Open Access and subscription publishing system.

Funders and institutions must work together closely to keep costs as low as possible, as the proportion of papers available in open access form continues to rise.

The support for gold Open Access has also raised fears that article processing charges could increase significantly. On this issue, however, we believe that the increased transparency provided by Open Access and the emergence of innovative new players – such as eLife and PeerJ, with others to follow – will continue to exert downward pressure on the market. There will be short-term costs, but the economic and societal gains that will flow from enabling the wider use of research findings will compensate for these many times over. There is still much to do in realizing this vision, but we are now well on our way. ◀

Photos: Private source

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