Royal Society response to the House of Commons Science and Technology Committee Inquiry into scientific publications

February 2004

This document is the Royal Society's submission to the House of Commons Science and Technology Committee Inquiry into Scientific Publications.[1] This submission has been endorsed on behalf of the Royal Society Council, by Sir John Enderby, the Physical Secretary and Vice-President. It was prepared in consultation with members of the Royal Society's Publishing Board.

Summary

- The publication of scientific theories and findings in peer-reviewed journals is the cornerstone of modern science. The costs of scientific publication must be paid for at some point in the process. The Government must ensure that the dissemination of scientific research is properly resourced, whether this is through the library acquisition budget under the subscription model or by additional funding of authors under the current Open Access model.
- The publisher provides many invaluable services including peer review, copyediting and formatting. Many have invested heavily in electronic publishing methods to the benefit of both the author and the reader. One of the causes of the increase in journal subscription rates is the increase in the number of papers submitted to, and published in, scientific journals.
- The Learned Society (not-for-profit) publishers play a vital role in the scientific community by using their publishing surplus not only to support and fund scientists and engineers but also to undertake science communication and public dialogue programmes, to promote science education and to interact with industry. A number of the smaller Learned Societies would be unlikely to survive without their publishing income and the work of the larger ones would be reduced.
- The Office of Fair Trading should ensure that scientific journals are subject to the same regulation as other markets.
- Many subscription-based publishers are taking steps to increase the availability of the papers that they publish, but more needs to be done. We, along with the majority of the world's Scientific Academies, support the recommendations of the InterAcademy Panel that electronic access to journals should be free of charge on publication to scientists in developing countries and within one year to the rest of the world.
- The Royal Society is in favour of the widest practicable dissemination of science but we believe that the current proposals for Open Access journals (where papers are free online to all) lack a sustainable business model. There are many uncertainties about how Open Access journals will operate as they become established and where authors will get the money to pay the required article processing fees. This has led to concerns that: the overall cost to the science base will be greater than under the subscription model, some authors will be unable to publish in certain journals due to lack of funds, the quality of publications may be reduced as publishers bow to commercial pressures to reduce the rejection rate of papers, it will not be possible to cross-subsidise minority interest publications, and that the total number of scientists funded by charities will be reduced in order to pay publishing fees. There is a need for all interested parties (authors, librarians, research funders, higher education policy makers and publishers of both traditional and Open Access journals) to work together to address these concerns and determine whether a sustainable business model for open access publishing can be developed.

- We welcome the Legal Deposit Libraries Act that will extend the system of legal deposit to non-print material. As the subsequent regulations are introduced we would like to see access to electronic material being made as generous as possible.
- Provided that rigorous peer-review continues to be the cornerstone of the scientific publishing operation, trends in delivery mechanisms are not expected to impact on fraud and malpractice.

Scientific publishing and the Royal Society

The Royal Society supports the widest possible practicable dissemination of scientific knowledge. As a publisher ourselves we regularly review the various business models in scientific publishing (including the developing model of Open Access) to determine which might best achieve this dissemination. As the Committee is aware, the Society has three major roles: as a Learned Society which includes the publishing role, organising meetings, recognising excellence and generally promoting science; as the UK's Academy of Science providing independent scientific advice and representing UK scientists within the UK and on the international stage; and as a funding agency providing financial support for scientists, engineers and technologists to pursue their work. The responses below to the questions posed by the Committee reflect these various roles. The findings of this inquiry into access to scientific journals (and the evidence submitted to it) will be of great interest to us.

The formal publication of scientific research in learned journals began in the 17th century to bring scientific findings and concepts to a wider audience than had previously been possible and in doing so to promote their discussion and development. The modern scientific publishing process has become increasingly sophisticated to the benefit of authors and their readers and today's scientific publishing is an excellent example of co-operation with authors, peer-reviewers and readers in every corner of the world.

The Society is the world's oldest continuously established scientific publisher and publishes six internationally respected journals, including 'Philosophical Transactions', the world's oldest scientific periodical, which first appeared in 1665. We are advised by our Publishing Board, which consists of members of the scientific community (including the editors of our journals) and representatives of other scientific publishers. Our journals now make optimum use of electronic production and delivery and the Society is recognised as a leader in the provision of editorial services to the benefit of both authors and readers. Our titles are:

- *Philosophical Transactions of the Royal Society: Mathematical, Physical and Engineering Sciences*
- *Philosophical Transactions of the Royal Society: Biological Sciences*
- *Proceedings of the Royal Society: Mathematical, Physical and Engineering Sciences*
- *Proceedings of the Royal Society: Biological Sciences*
- *Biology Letters*
- *Notes and Records*, dealing with the history of science, engineering, medicine and technology.

We have recently announced a new journal *Interface* that will publish papers reporting scientific advances at the interface between the biological and the physical sciences. This will reflect the huge upsurge in (and funding for) cross-disciplinary science and the demand for a publishing medium for the findings of such research that is currently underserved by existing journals.

1 What impact do publishers' current policies on pricing and provision of scientific journals, particularly 'big deal schemes', have on libraries and the teaching and research communities they serve?

The majority of commercial and not-for-profit publishers operate on a subscription basis. This is potentially restrictive in the sense that the results of scientific research are initially available to those institutions and individuals who are able to, or that choose to, subscribe to given journals. However, as outlined below and in

subsequent sections, many publishers are taking action to increase the availability of their journals online. We have been concerned about the pricing of journals by some commercial publishers, as outlined in our letter to the Director General of Fair Trading supporting a review of practices in the market for scientific, technical and medical journals in 2001.[2]

a) 'Big deals'

Librarians initially welcomed the 'big deals' under which large publishers typically double the online content taken by a given library in return for what is seen as a relatively small increased cost on (normally) a three-year contract. It has since become clear that because collectively these publishers often represent about half of a library's serials collection, these deals have 'chained' budgets and removed choice. Many libraries have no plans to renew them.

b) The role of the Learned Society publishers

Both Learned Society publishers and commercial publishers play a key role in the dissemination of science. The Learned Society publishers operate on a not-for-profit basis and their journals tend to be more competitively priced. In contrast to the commercial publishers, any surplus generated through this not-for-profit publishing is used to directly support the UK scientific community (and the wider public) thorough the many activities of the Learned Societies. The Committee has itself recognised the importance of these activities[3], which - in addition to supporting and funding scientists and engineers - include science communication and public dialogue programmes, the promotion of science education and interactions with industry. A number of the smaller Learned Societies would be unlikely to survive without their publishing income and even the larger Societies (such as the Royal Society) would be forced to reduce the scale of their activities. They would also be unable to develop new journals and take advantage of new technology, to the detriment of authors and readers. The Royal Society's publishing income enables us to undertake a variety of activities for the benefit of science that would otherwise be impossible. Much of the income from scientific publishing is generated overseas, 92% in the case of the Royal Society. In the case of the Learned Society publishers, this represents substantial funding for UK science. From the evidence submitted to its inquiry into Learned Societies[4], the Committee will be aware that the Learned Societies use this income to leverage substantial additional funds into the science base in the UK. Commercial publishers publish some journals on behalf of the smaller Learned Societies. In these cases the commercial publisher will retain a proportion of the surplus income.

c) Increasing access to scientific papers

We would of course be concerned if the progress of science was being hampered because the cost of journals was restricting the availability of the latest research findings. In a statement published in December 2003, the InterAcademy Panel (IAP) made a number of recommendations aimed at increasing the dissemination of scientific knowledge[5]. These include providing electronic access to journals within one year of publication and immediate access for scientists in developing countries. The Royal Society, along with the majority of the world's scientific academies, has endorsed these recommendations.

Publishers (both commercial and not-for-profit) differ in their approach to making their content available to those who do not subscribe to their journals. Apart from some pharmaceutical and medical journals, the abstracts of most journal papers are available free of charge online from the date of publication. The abstract summarises the key findings of the paper and will also provide contact details of the authors from whom more information (for example about the experimental method used) can be sought by scientists and other interested parties. The full content of Royal Society journals is made available free of charge online 12 months after publication. In addition our liberal copyright policies mean that authors can make the papers published in our journals freely available on their websites and can reproduce them for teaching purposes within their university. Enabling access by researchers to scientific findings in developing countries where libraries are less well resourced is of particular importance. A number, but not all, commercial and not-for profit publishers offer special arrangements to developing countries. The Royal Society makes its journals

available online for free to 15 selected developing countries via the Programme for the Enhancement of Research Information run by the International Network for the Availability of Scientific Publications INASP/PERI initiative.[6] This programme aims to support capacity building in the research sector of developing and transitional countries by strengthening the production, access and dissemination of information and knowledge.

As well as establishing a presence online for current content, it is also worth noting that a number of publishers with a long record of publishing, including The Royal Society, have begun to mine their impressive back archive of journal material. The Royal Society of Chemistry, for instance, has just released its complete journal archive back to the early nineteenth century, consisting of 195,000 articles and 1.2 million pages. The Royal Society has plans to add the 56,000 articles published between 1665 and 1996 to its own website. For the first time all this content will be available to anyone who can access the Internet, allowing searches across a much greater volume of material. This will extend access substantially and be an invaluable tool for researchers and historians alike.

d) Services provided by the publisher

In considering subscription prices and their alternatives it is important to recognise the services that the publisher provides. Once a paper is submitted to a journal the publisher will manage the peer review process. In liaison with the academic editor and editorial board, two or more referees are selected and assigned an article for peer review. Often papers require substantial revision and more that one round of refereeing. Even though the referees are volunteers, managing the peer review process to ensure timeliness and quality is administratively expensive. In the case of the Royal Society's journals the peer review process represents 42% of our publishing staff costs. Given that quality journals typically reject 65-70% of submissions on the basis of peer review, this represents a considerable cost for which there is no financial return. Those papers that are accepted are passed to sub-editors employed by the publisher. They will ensure that language is unambiguous, correct style and nomenclature has been applied and illustrative material is of the required standard. For an increasing number of authors and readers English is not their first language. The copyediting undertaken by publishers is crucial in ensuring that the finished paper is understandable to the global scientific community. The article content is then converted to the required format for both electronic and print publication.

Many scientific publishers, including the Royal Society, have taken advantage of the opportunities offered by electronic publishing, investing heavily in electronic systems for peer review, editing and electronic publishing systems. Electronic journals are provided via online platforms, which provide valued added features such as sophisticated searching and links to and from other relevant articles and abstract and indexing services. For example, reference linking provides links to the articles cited in papers and will in turn link to papers that cite that article in the future. This requires a more intense level of editing, cross checking and document structure. This increases the quality and value of the service for the reader but also increases production costs.

The print journal is still a requirement for most libraries; in addition this requires typesetting, printing and distribution.

2 What action should Government, academic institutions and publishers be taking to promote a competitive market in scientific publications?

Given the global nature of scientific publishing, it is not clear how a national government (apart perhaps from the US, as outlined below) can have a substantive impact on the market. It is of course important that the market for scientific publishing in the UK is subject to the same regulation as other markets and we welcomed the examination by the Office of Fair Trading (OFT) into the market for scientific, technical and

medical journals in 2002.[7] This concluded that, while there was evidence to suggest that the market for these journals may not be working, it was inappropriate at the time for the OFT to intervene in the market. However they committed to keep the situation under review. The fact that VAT is chargeable at the full rate on electronic journals (despite being zero-rated on printed journals) may be having a negative effect on the market for electronic journals.

The one government that might substantially influence the global market is that of the United States, which has a critical mass of scientific output. The Royal Society is not alone in having a substantial number of its authors (30% in our case) based in the United States and any changes in relevant US legislation would impact on the operation of UK journals. For example, the US Public Access to Science Bill, which was introduced in June 2003, would (if passed) prohibit copyright protection for any works stemming from substantially federally funded research. Most publishers seek copyright assignment from authors and others require a licence to publish. While any resulting Act by itself would not guarantee free and open access to science and medical research results, it has led to proposals that such papers would need to be published in media to which access is widely available. As a result there is concern that the momentum generated by these discussions might result in the scientific publishing industry moving towards an Open Access model (where no charge is made to access journals online) before the infrastructure to support that move is in place. Open Access is considered in more detail in the next section.

Institutions, Learned Societies and influential individuals can, if they wish, encourage their staff, members and colleagues to support (both through purchase of and publication in) those journals that they believe have appropriate pricing and access conditions. We have already highlighted the IAP statement, signed by the majority of the world's scientific academies, which recommends actions that will improve access to scientific information. In our report *Keeping science open*[8] the Royal Society recommended that Learned Societies have liberal copyright policies and make their publications available at as low a cost as is reasonably feasible and that scientists, wherever practicable, publish in journals with liberal access policies.

3 What are the consequences of increasing numbers of Open Access journals, for example for the operation of the Research Assessment Exercise and other selection processes? Should the Government support such a trend and, if so, how?

The Royal Society supports the principle that scientific research literature should be disseminated in the widest practicable way but recognises that the business model must balance the needs of the various stakeholders in the scientific community. While it is possible that access to scientific information could be enhanced via the traditional subscription model, there is currently some support within sectors of the scientific community for an Open Access model of publishing. Whether the current model of Open Access publishing has a lasting impact on the scientific world will depend on whether a sustainable business model can be developed and whether the quality of the journal is judged highly enough by scientists so that they are prepared to publish there. The current Open Access model is at an early stage and is surrounded by much uncertainty. We highlight some of these uncertainties and the associated concerns in the following sections, basing our comments on the trends in Open Access journals that seem to be emerging.

a) The current model of Open Access journals

Under the model currently proposed for Open Access journals, the cost of publishing is paid by the author or their funder (rather than the purchaser of the journal) and anyone with a connection to the Internet can (without charge) read, download, print, copy, and redistribute any published article or to use its contents in derivative works, such as databases, textbooks, or other teaching materials. At the moment, Open Access publishing accounts for an estimated 5% of the overall scientific publishing output and is currently largely confined to papers reporting the findings of original research in the biomedical sciences. The main publishers are the UK-based BioMedCentral (which is aiming to establish a viable commercial business model) and the

US-based Public Library of Science (PLoS) (a not-for-profit organisation run for and by scientists). Both have received financial subsidy. PLoS has received considerable private funding to cover its establishment costs, most notably a grant of USD9M from the Moore Foundation. Biomed Central has received support from the Joint Information Systems Committee (JISC) which is funded by the UK post-16 and higher education funding councils. Since July 2003, JISC has paid the BioMed Central membership for all UK universities (the implications of this central mode of funding are discussed below) and is also offering grants to publishers or Learned Societies looking to move to an open access model for their journal(s). There is currently no practical evidence that Open Access journals, as currently proposed, are sustainable without subsidy and this has caused understandable concern.

b) Estimates of the cost of publishing

Under the current model of Open Access journals, an article-processing fee is charged to the author to cover the costs of peer review and publication. Estimates of a sustainable level for this fee vary from USD500 to USD10,000. We have been concerned that those providing the lower estimates have underestimated the value and cost of the services such as peer review and copy editing that are provided by the publisher (some these are outlined in section 1d). It is important to recognise that a not insignificant cost is incurred in the administration of the peer review process. As noted in section 1d, for the Royal Society this represents 42% of publishing staff costs. Assuming that the processing fee is payable on acceptance (which is the case currently), significant costs will be incurred in peer reviewing papers that are later rejected. In quality journals this rejection rate is 65-70%. There will undoubtedly be pressure to increase the number of papers that are accepted in order to make the business model sustainable and this could lead to an associated drop in quality of the journals. The base fee is likely to be based on the prestige of the journal (in part linked to their high rejection rates), thus the fee is expected to vary between journals. It is also possible that the fee might vary according to the nature of the paper with more being charged for the number of figures, the length or amount of editorial work required. Since some of these attributes might vary between disciplines, any differential pricing structure should be viewed with caution.

c) How might open access journals be funded in the UK?

In order to publish a sustainable Open Access journal under the current model either the authors or their institutions must be prepared (and able) to pay the article-processing fee (also known as acceptance fees). Given the uncertainties about the source of the funding required for these fees and the way it might be allocated, it is difficult to estimate the impact on the science base. Open Access, actual and proposed, is currently very much concentrated in biomedicine, which receives substantial funding from the pharmaceutical industry that could cover these costs. Other disciplines are unlikely to be funded to the same level. Should the current model of Open Access become widespread, it is not yet clear how the money for the fee would be allocated to researchers or their institutions. At least three possible ways of funding the article processing fees are emerging: central funding, funding via the research grant and funding by the university. In the case of BioMed Central, JISC is paying the subscription fee for all UK universities so that researchers do not have to pay individual acceptance fees. It is unlikely that this central funding of Open Access journals will be sustainable in the long term without additional funding being allocated to JISC. In order to allow scientists the freedom to choose where they submit their papers (a key requirement of any system) the central payment of submission fees would need to be extended to all open access publishers (in the UK and overseas) as they emerge.

A second option is to pay for processing fees through the funding that researchers receive from research grants and fellowships. For example the Wellcome Trust has recently agreed to allow journal processing fees to be paid out of its grants. This would obviously require additional funds to be allocated to the Research Councils and raises a number of questions about how the required amount of money could be fairly determined at the outset of a research grant or fellowship (particularly given that publication rates are likely to differ between research areas). There is also the question of the impact on the funding of research by charities, particularly those without the considerable resources of the Wellcome Trust. The Royal Society, for

example, runs number of funding schemes for scientists. Perhaps the best known is the University Research Fellowships, most of which are funded by our Parliamentary Grant in Aid (PGA). Our 300 University Research Fellows publish an average of about four papers per year. Based on an estimate of USD3,000 fee per article (which we believe is realistic if the current high standards in publishing are to be maintained) an extra USD3.6M or £1.96M per year would need to be found to fund our URFs alone. In the absence of an increase to our PGA we would be forced with the choice of reducing amount of research money funding allocated to our URFs, reducing in the total number of URFs that we could support or diverting funds from our other activities to compensate.

There has been no proper estimate of whether the funds that would be required to meet processing fees would be greater or less than the money allocated to libraries for their acquisition budgets. Such an estimate is required if the net cost to UK science is to be quantified. A study in the US counted the number of papers published by scientists and social scientists at Duke University and estimated that the cost of publishing these in PLoS (with their USD1500 fee) was USD6.75M. They assumed that the university would pay the article fee, a third option for funding, and compared this with the university's smaller budget of USD6.6M for all its journals and online databases (and not just those used by the scientists and social scientists).[9]

d) Will some authors be unable to afford to publish?
We are opposed to any publication model that prevents high quality scientific research from being published. Under the subscription model any author can publish a paper in any journal provided that it passes the peer review process. It is not clear where authors who are not affiliated to an institution (e.g. junior researchers that are between contracts) or in receipt of a research grant would find the money to pay the processing fee for Open Access journals. Authors from poorly funded institutions (for example in developing countries) will also face difficulties. We welcome the commitment from PLoS to waive or reduce charges for any author who cannot afford to pay publication charges but it remains to be seen what criteria will be used judge whether the fee can be afforded and whether the impact of such a waiver on the sustainability of the current model of Open Access journals has been properly considered.

e) Can the current Open access model work for all journals?
The current model of Open Access publishing is concerned with unsolicited papers reporting the findings of research. It is unlikely that authors would pay a processing fee for papers that had been commissioned by the publishers and Open Access publishers such as Biomed Central are retaining a subscription model for these articles and journals. Commissioned work includes journals such as the Royal Society's *Transactions* journals that publish the proceedings of our international scientific Discussion Meetings and bring together the working of leading scientists to produce themed issues that represent the latest thinking on particular scientific issues (e.g. nanotechnology). Subscription income also allows a valuable cross-subsidisation of minority interest publications that, although not financially viable, are highly valued by researchers in the discipline in question. Examples include the Royal Society's history of science journal *Notes and Records* and its *Biographical Memoirs* annual publication that contains the definitive accounts of the lives and work of its deceased Fellows. Both commercial and not-for-profit publishers cross-subsidise books and journals. For example in 2002/03, the Society invested £104k in this 'subsidised' publishing activity. Future cross-subsidised activities may include the placing of the back content of Royal Society journals on the Internet (see 1c). It is unlikely that the subsidised publications, currently published by both commercial and not-for-profit publishers, would survive under the current Open Access model.

f) Will authors publish in Open Access journals?
Scientists submit their work to a particular journal based on its appropriateness to the readership they want to reach and on its prestige. The Open Access movement is in its infancy and it is not yet clear whether authors will submit papers to Open Access journals in sufficient numbers when the excitement surrounding the launch of the first journals has passed. In the past, authors have reverted quickly to their traditional journals that have the usage statistics and citation values that help to build their careers. The PLoS recognises

that new and mid-career researchers will be concerned about the risk of publishing their best work in a journal without a track record. They promise that the academic editors will be leaders in the field, and for every accepted manuscript they will supply a signed endorsement explaining the importance of the work and how it has satisfied these rigorous criteria for publication. They suggest that this letter can be provided as support for grants, job applications, and so on. Essentially therefore the success of these journals essentially depends on the support of the leading academics in the field (in terms of acting as editors and publishing in the journals themselves) and the associated development of the journal's impact factor. We do not envisage any impact on the Research Assessment Exercise (RAE) unless the commercial pressures on publishers to increase the number of papers that they publish (and reduce the numbers that they reject) results in a reduction in the quality of the papers published in Open Access journals. We expect papers published in Open Access journals to be judged by the same criteria as subscription journals. Electronic journals operating 'open peer review' (where papers are initially published without peer review) could impact on the RAE and these are addressed in section 5.

g) Impact on the Learned Societies

As will be evident from the examples given in this and preceding sections, a widespread move from a subscription to an Open Access model could have a substantial impact on the work that the Learned Societies can undertake for their scientific communities (including the range of journals that they could publish) and for government, industry and the wider public. Those that are both publishers and research funders could be doubly affected. This is naturally of great concern to us.

h) Addressing the uncertainties

It will be clear from the points above that there is a great deal of uncertainty surrounding the current model of Open Access journals. The principle of increasing the availability of scientific information is to be commended. However, given the central importance of scientific publications in underpinning the dissemination of research and in the absence of a practical demonstration of a sustainable business case for the current model of Open Access journals, we (along with much of the scientific community) are understandably cautious. Within the next six months it is hoped that some workable proposals will emerge. We believe that progress in evaluating the potential for Open Access publishing (particularly outside the Biomedical community) and assessing its possible impact is hindered by the fact that the various interested parties such as authors, librarians, research funders, higher education policy makers and publishers of both traditional and Open Access journals are all meeting separately to discuss these issues. Prior to the launch of this Inquiry we had been planning to facilitate a round table with all interested parties to fully discuss all the issues relating to open access publication and the potential impact on the scientific community. We may now wait until after the publication of the Committee's report to arrange this meeting.

4 How effectively are the Legal Deposit Libraries making available non-print scientific publications to the research community and what steps should they be taking in that respect?

We welcome the Legal Deposit Libraries Act, which enables the Secretary of State to make regulations to extend the system of legal deposit to non-print material and look forward to the introduction of the regulations through which the Act will be implemented. Access to material deposited under the 2000 Code of practice for the voluntary deposit of non-print publications is via the Reading Rooms of the British Library. Wider access within or between individual libraries, or use for such purposes as document supply and Inter-Library Loan, is only permitted under explicit licence from the publisher and with the payment of fees and/or royalties set by the publisher. As the subsequent regulations are introduced we would like to see access conditions made as generous as possible without damaging the viability of publishers.

5 What impact will trends in academic journal publishing have on the risks of scientific fraud and malpractice?

The scientific community is aware of the risks of scientific fraud and malpractice even within the peer review system and bodies such as the Committee on Publication Ethics[10] have been established to address breaches of research and publication ethics. Provided that rigorous peer-review continues to be the cornerstone of the scientific publishing operation, trends in delivery mechanisms are not expected to increase fraud and malpractice. The two main Open Access publishers, Biomed Central and PLoS, publish only peer-reviewed papers. The value of journal titles is to provide a quality assurance to the reader regarding the standard of the paper(s). As outlined in section 3, there is a concern that as publishers attempt to develop a sustainable open access business model there will be an incentive to increase the number of papers that are published - because the costs of peer reviewing papers that are later rejected cannot be reclaimed if payment is based on acceptance. However it is not clear whether publishers will give in to this pressure and if they do whether the associated reduction in quality would increase the risks of scientific fraud or malpractice.

Of greater concern would be a move towards open peer review. The procedure varies but essentially papers are placed on the journal's website with a request for comments. Papers are revised as reviews are received and re-posted on the website. A confidential peer review stage may sometimes follow. Given the increasing number of people who have access to the Internet there is a possibility that people who are less familiar with the importance of peer review may use the information contained in the non-peer reviewed version. This would be of particular concern in the medical sciences where papers are more likely to be of interest to the non-expert. Scientific research is accredited through publication in peer-reviewed journals and there would be difficulty in incorporating such open peer review journals into assessment methods such as recruitment, grant applications and the RAE since it would be unclear to what extent the papers had been subject to peer review.

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