GLOBAL RHEUMATOLOGY
BY PANLAR

E-ISSN: 2709-5533
Vol 3 / Jul - Dic [2022]
globalrheumpanlar.org

SPECIAL ARTICLE

Artículo de reflexión | Publicaciones científicas: ¿El conocimiento como un mercado o como un bien común?

Reflection article | Scientific publications: Knowledge: A market or a common good?

Publicações científicas: Conhecimento como mercado ou como bem comum?

https://doi.org/10.46856/grp.26.e144

Date received: 20 Septiembre 2022
Date acceptance:
Date published:

Cite as: Caballero CV, Fajardo E. Reflection article | Scientific publications: Knowledge: A market or a common good?. Global Rheumatology. Vol 4 / Jan - Jun [2023]. Available from: https://doi.org/10.46856/grp.26.e144

Authors

Carlo V Caballero-Uribe
carvica@gmail.com
Associate professor Universidad del Norte.
Barranquilla Colombia
ORCID: 0000-0002-9845-8620

Estefanía Fajardo
estefaniafajardod@gmail.com
science journalist
ORCID: 0000-0003-2957-8271

Correspondence

Hospital Universidad del Norte
Kra 30 vía al Aeropuerto
Soledad, Atlántico
carvica@gmail.com

GLOBAL RHEUMATOLOGY
BY PANLAR

SPECIAL ARTICLE

Reflection article | Scientific publications: Knowledge: A market or a common good?

GLOBAL RHEUMATOLOGY
BY PANLAR

Abstracts

In English

Scientific publications have become the preferred vehicle to announce advances made in the field of knowledge.

In recent decades, the distribution of scientific knowledge has undergone important changes aided by the strong emergence of Open Access and the so-called *open science* movements. These changes have brought about a conceptual modification regarding the past, present, and future of scientific publications. Technological advances have also made it easier and less costly to share knowledge, a situation tha t is undoubtedly influencing the development of these publications.

In this reflection paper, we will describe the events that have occurred around the distribution of science and will analyze the available information to subsequently scrutinize the presence of scientific publications and project the possible immediate future of such important publishing activity.

First, we will describe the origins of scientific publication, its achievements, and the establishment of an industrial market, as well as the existence of a prestige emporium and the movements that advocate for a change in the commercial vision of the sector so that science is better served as a common good. In addition, we will review the role of scientific publications in Latin America and the challenges of an industry whose main product is knowledge.
.

Key words

Scientific Publications, Open Access, Reflection Article.

GLOBAL RHEUMATOLOGY
BY PANLAR

Abstracts

In Spanish

Las publicaciones científicas se han convertido en el vehículo preferido para dar a conocer los avances en el campo de la ciencia.

En las últimas décadas ocurrieron cambios importantes relacionados con la difusión del conocimiento científico y, además, surgieron con fuerza los movimientos del acceso abierto y lo que se ha denominado ciencia abierta. Así mismo, estos cambios han generado una modificación conceptual respecto a lo que fueron las publicaciones científicas, lo que representan en la actualidad y hacia dónde pueden dirigirse en el futuro. También los avances tecnológicos han permitido que cada vez sea más fácil y menos costoso compartir el conocimiento, situación que, sin duda, está influyendo en el desarrollo de estas publicaciones.

En este artículo de reflexión describiremos los fenómenos que se han presentado en torno a la difusión de la ciencia, y realizaremos un análisis de la información disponible para, posteriormente, radiografiar el presente de las publicaciones científicas y proyectar lo que sería el futuro inmediato de esta importante actividad editorial.

Inicialmente, describiremos los orígenes de la publicación científica, sus logros y el establecimiento de una industria con un mercado, así como la existencia de un emporio del prestigio y los movimientos que abogan por un cambio en la visión comercial del sector para que se atienda más la ciencia como un bien común. Además, revisaremos el papel de las publicaciones científicas en América Latina y los retos y desafíos de una industria cuyo producto principal es el conocimiento.

Palabras clave

Publicaciones científicas, Acceso abierto, Artículo de reflexión.

GLOBAL RHEUMATOLOGY
BY PANLAR

Abstracts

In Portuguese

As publicações científicas tornaram-se o veículo preferencial para divulgar os avanços no campo da ciência.

Nas últimas décadas, ocorreram mudanças importantes relacionadas à disseminação do conhecimento científico e, além disso, surgiram com força os movimentos de acesso aberto e o que tem sido chamado de ciência aberta. Da mesma forma, estas mudanças geraram uma modificação conceitual sobre o que eram as publicações científicas, o que representam atualmente e para onde podem ir no futuro. Os avanços tecnológicos também tornaram mais fácil e menos oneroso o compartilhamento do conhecimento, situação que, sem dúvida, está influenciando o desenvolvimento destas publicações.

Neste artigo de reflexão descreveremos os fenômenos que surgiram em torno da divulgação da ciência, e faremos uma análise da informação disponível para, posteriormente, radiografar o presente das publicações científicas e projetar qual o futuro imediato desta importante atividade de publicação.

Inicialmente, descreveremos as origens da publicação científica, as suas conquistas e o estabelecimento de uma indústria com mercado, bem como a existência de um empório de prestígio e os movimentos que defendem uma mudança na visão comercial do setor para que haja mais ciência como um bem comum. Além disso, revisaremos o papel das publicações científicas na América Latina e os desafios de uma indústria cujo principal produto é o conhecimento.

Key words

Publicações Científicas, Acesso Livre, Artigo De Reflexão

Introduction

ORIGINS

Humans have had the ability to communicate since prehistoric times. Exchanging words and later opinions and knowledge have been key to the development of mankind. However, what is the origin of scientific publication? The quest for finding answers to this question takes us back centuries, after the invention of paper and later of the printing press, and brings us to the present, a digital era, to the construction of what, possibly, will be the future of scholarly publishing.

The first scientific publications, identified as such, date back to the 18th century and appear gradually, when the consolidation of expert groups in which some of its members with affinities around an area of knowledge began meeting periodically (what we know today as congresses), to discuss ideas that ended being the seed of *scientific societies*. This is how the Royal Society (1660) was born in England, and later the *Académie des Sciences* (1666) in France, as some of the first organizations of this type.

In 1665, the first secretary of the Royal Society, Henry Oldenburg, a German-born British citizen considered one of the foremost scientific intelligencers of the early modern period and who had a large network of contacts throughout Europe, began sending his manuscripts -with the results of his studies- to experts who could judge their quality before publication. Once he had the "blessing" of the Royal Society, Oldenburg assembled the manuscripts, organized the contents, printed the first issue of *Philosophical Transactions of the Royal Society*, and called for subscriptions.

However, despite its title, *Philosophical Transactions* was not an official publication of the Royal Society, something that Oldenburg made clear in the first issue and then ratified in a second volume
produced in 1666. This marked the beginning of the modern, peer-reviewed, scientific journal. *Philosophical Transactions of the Royal Society* continues to be published and is the oldest scientific journal in the world.

Until 1666, scientific developments were basically discussed through correspondence between experts and in different meetings that were even called "Invisible College". Robert Boyle, one of the pioneers of the scientific method, and Oldenburg's boss and friend, was one of the main promoters of these academic meetings (1).

Evaluation processes, citations, and different procedures articulated with the edition, publication, and distribution of contents followed, and along with economic, social, and industrial developments, gained strength within societies and science. At the same time, measurements started to be developed.

In rheumatology, for instance, the first scientific publications appeared somewhat late, at the beginning of the 20th century.

The first journal specifically dedicated to rheumatism was published in 1929, in the Netherlands, by the scientist Van Breemen and was titled Acta *Rheumatologica* (2). This was the official journal of the Ligue *Internationale Contre le Rhumatisme* and was published up to the outbreak of the second world war in 1939 when the Netherlands was invaded, and the archives were confiscated or destroyed.

Within the PANLAR area, the first serial in journal format was titled *Archivos Interamericanos de Reumatología* (AIR) and was edited in Brazil in three languages (English, Spanish, and Portuguese), and circulated from 1958 to 1962 under the direction of Israel Bonomo and Moisés Mizrraji (3). Actually there are more than 50 journals addressing rheumatology topics worldwide .
3)

STM

For centuries books were often the most widely accepted and recognized form of science communication, but in the mid-twentieth century, Robert Maxwell would appear and change the history of scientific publishing to transform it into one of the most lucrative businesses in publishing.

Until then, serials belonged to scientific societies and were almost exclusively dedicated to their members. The industry created by Maxwell through the company Pergamon, later called STM *(International Scientific, Technical, and Medical Publishing)*, was based on the need for scientific societies to disseminate their research and distribute their journals in bookstores. Every bookstore, every university, and every scientific institute wanted a copy, and, on the other hand, the authors were so grateful to see their work in print that they did not want any kind of compensation.

Maxwell did not know much about publishing, but he knew a lot about business. He soon understood this during the visit of Ferdinand Springer, whose father had founded Springer-Verlag, a well-known German publisher that had published books by scientists of the stature of Albert Einstein and Max Born. As Springer-Verlag –being a German company– was not able to send books out of the country, Maxwell acted as an intermediary to this end.

Thus, a new knowledge business was born. Pergamon was founded in 1948 with only six serials (journals) and two books and went to 59 journals in 1960 and 418 in 1992. *"The secret of Pergamon's success was to publish a large number of journals so that the established titles could support the new ones during their formative years"*. (4)

In March 1991, Maxwell sold Pergamon Press to the giant scholarly publisher Elsevier for 440 million pounds; the funds were used to repay the large loans Maxwell had taken on when he took control of the New York Daily News. Today, STM has more than 140 members worldwide, including major commercial publishers, learned societies, and university presses.

Since then, the commercial scientific publishing sector has grown into a $25.2 billion industry, with some of the top-ranked companies showing profit margins of nearly 40%. By comparison, we see that tech giant Google's profit margin is about 22%. An analysis based on 45 million documents indexed in the Web of Science over the period 1973-2013 shows that in both natural and medical sciences (NMS) and social sciences and humanities (SSH), Reed-Elsevier, Wiley-Blackwell, Springer, and Taylor & Francis increased their share of the published output, especially since the advent of the digital era. Combined, the top five most prolific publishers account for more than 50% of all articles published in 2013. (5)

Together they control the copyrights of much of the world's scientific literature and charge billions of dollars every year for access to that body of knowledge, ensuring them huge profits in the process.

THE MARKET OF PRESTIGE

In the last decades of the 20th century, scientific journals established themselves as the preferred vehicle for the communication of science. The strength of the publishing industry -after making universities and bookstores its main clients- was the creation, over time, of the need to give a reward (in the form of awards) to authors who published in journals.

It is then that a new protagonist appears in this story as well as in the scholarly publishing industry: Eugene Garfield, a pioneer in bibliographic database services

of bibliometrics and scientometrics, specialized in analysis and citation indexing. Garfield began working at Johns Hopkins University in 1951, on an automatic indexing project for the medical school library. This work, called Welch Project, was funded by the National Library of Medicine, and in fact, had been underway since 1948 as one of their first developments to systematize both the organizational tasks of the library and the retrieval of medical literature.

Garfield worked on this project until its completion in 1953, which allowed him to dig deeper into the linguistic structure of reviews and the traditional methods of citation indexing. He thus could observe the link between the references and the views expressed in a scientific paper. Garfield suggested that by following the "life" or rotation of an article it was possible to find out the development of its main idea or scientific approach, uses, and implementations, and concluded that the best way to follow up the trajectory and validity of an article is by citation indexing (6).

Thus, "citation culture" became one of the dogmas in the field of bibliometrics with two concepts that were revolutionary at the time: *the research front,* which allows -after reviewing the citations on a topic- to obtain a number of highly cited articles that make up the central documents of a study topic, and the journal's *impact factor,* determined as the average number of times in a given year that scientific articles published by the journal in the last two years were cited. Otherwise, he had discovered which were the most relevant publications on a given topic and, in turn, in which journals they were most likely to be published.

Garfield also invented the Science Citation Index (SCI), the predecessor of the current Web of Science (WoS), thus revolutionizing the scholarly information sector, through the quantitative study of scientific literature, among other areas of IT. In addition, Garfield made significant contributions to the understanding of the dynamics of growth and internal organization of the research companies, based largely on SCI data and subsequent variants created by his company: the Institute for Scientific Information (ISI)

The impact factor became popular, partly, because it provides an "objective" measure of the quality of a journal, and also because is a small and ordered number easy to understand. It is widely used by librarians, authors, readers, and promotion committees. SCI was finally bought by corporate giant Thomson Reuters and later by its current owners: the Clarivate company.

Journal evaluation and a "market of prestige", which measures success, grew along with the impact factor. Journals are admired because they publish quality scholarly works that, although not being evaluated directly by the audience or by their intrinsic quality, are indirectly evaluated by the number of times they are cited and by the journals in which they are published. Citations became the "gold standard" to measure research impact, and journals became the main vehicle for research communication. (7)

Another factor to consider in the prestige market is the difficulty access to the benefit measured as the articles' acceptance rates. Moreover, it is a common belief that journals with lower acceptance rates are more "prestigious", and those considered of high impact have variable acceptance rates averaging 32%, which means that they reject almost 70% of the articles they receive (8). That is, the more articles rejected, the more "prestigious" the journal.

Therefore, journals are encouraged to accept only the most striking articles for publication; likewise, universities and funders are encouraged to reward only those applicants who publish (and review or edit) in "prestigious" journals, inviting reviewers and editors to volunteer their time to high-impact journals – which offer high prestige and reputation in the community – even though there is no always objective evidence that the best publications are to be found in those journals (9). On the other hand, authors are encouraged to submit their work to prestigious high-impact journals, and indirectly to consider questionable research practices that

increase their chances of publication and are accustomed to citing articles published in this group of journals (regardless of the reality or quality of the work). In this way, it is only natural that traditional journals remain at the top of the hierarchical system while new entrants to the scholarly publishing market are frustrated.

CHANGE OF MODEL

If the above was an x-ray of what has happened, what follows in this process will be very similar to turbulence. We will shake up what has been sacred in the field of research and put on the table what is already in place and here to stay.

Key milestones in the development of scientific publications

The histpry of scientific publications is full of events and changes. Since their creation, through monetization and impact factor, to the declaration of open science. A look at these major changes.

1

1665

Henry Oldenburg

Initial idea, development of subscriptions and peer review. Structuring publications as we know them.

2

1948

Robert Maxwell

Establishment of the scientific publishing industry (STM). Transforms scientific publishing into a giant publishing industry.

3

1956

Eugene Garfield

Developer of the Impact Factor. Its creation provides a tool to classify journals.

4

1997

SciELO Project

The Scientific Electronic Library Online (SciELO) projec was launched in Brazil with the aim of making scientific research generated in Latin America visible without payment barriers. This idea was joined in 2004 by the Mexico-based Redalyc project.

5

2001

Budapest Declaration

The Budapest Declaration officially launched the open access movement, which seeks to make science accessible by removing barriers.

6

2012

DORA

The Declaration of Research Assessment (DORA) in San Francisco acknowledges the need to improve the ways in which researchers and the results of academic research are assessed in order to overcome the single Impact Factor as a determinant in the evaluations of scientific publications.

7

2018

Plan S

Plan S is implemented in Europe, requiring all privately funded research publications to be published in open access journals.

8

2022

UNESCO

UNESCO welcomes a 193-country consensus definition of Open Science. The document makes it clear thar a fee-based publishing method, where the immediate access to scientific publications is only granted in return for payment, is not in line with their recommendations and that any transfer or licensing of copyright to third parties should not restrict the public's right to immediate open access to a scientific publication.

Cite as: Caballero CV, Fajardo E. Artículo de reflexión | Publicaciones científicas: ¿El conocimiento como un mercado o como un bien común. Global Rheumatology. Vol 3 / Jul - Dic [2022]. Available from: https://doi.org/10.46856/grp.12.e113

By the end of the 20th century, the Internet was coming to life. Suddenly, through the World Wide Web anyone with an internet connection could publish information and, for pennies, get it out to the masses. The Free Software Movement exemplifies the full potential of knowledge sharing on the Web. Relevant projects began to emerge, such as the advent of archives like *arXiv.org,* which encouraged scientists to self-archive their pre-publication articles in an online repository.

On the other hand, librarians around the world found themselves in the midst of a major problem now known as the "serials crisis". This was the result of the rapidly rising journal subscription prices, above inflation rates, which forced many of the world's leading libraries to make difficult choices in selecting the journals they could make available. (7, 10)

This is where projects such as the Public Knowledge Project (PKP), which developed free software for the production of a scientific journal (1998), the OJS (Open Journals Systems), a joint project of Stanford University and British Columbia, and free online journals such as the *Journal of Medical Internet Research* come from.

In 2000, the National Institutes of Health, launched PubMed Central, an Open Access repository that currently stores almost 6 million articles. Likewise BioMed Central and PLOs emerged as the first Open Access publishers. In 2005, Wellcome Trust required grant recipients to deposit a copy of their articles in PubMed Central.

In 2001, the Open Society Institute (OSI) held a meeting in Budapest, Hungary, to promote the advances on the Internet regarding the free publication of research articles in all academic fields. From this would arise the Budapest Declaration as a foundational milestone of what would become known as the Open Access (OA) movement (11). This declaration established that scholarly literature in all fields should be freely available on the internet to increase its distribution and world impact; additionally, the declaration established that the contents of journals could be freely accessible through self-archiving by scholars and invited them to publish in open access journals. Similar meetings were held shortly thereafter in other countries around the world. In Germany, the Berlin Declaration (12), which arose from a meeting organized by the Max Planck Society, established that the Internet has dramatically changed the "practical and economic realities of the distribution of scientific knowledge and cultural heritage", and in the United States, in Bethesda, Maryland, at a meeting at the Howard Hughes Medical Institute was written the Bethesda Declaration (13), urging any entity or person involved in the production or promotion of scientific research to disseminate the findings through Open Access publications. As a result of these three initial statements, the term is established as the ideal term to describe initiatives that make research more widely and readily available.

The Open Access (OA) movement, arose from the need to take greater advantage of the technological disruption that was taking place and is based on the conviction that the distribution of the results of scientific and technical activity can drive progress in different societies, considering the existing global gap with respect to access, creation, and use of scientific advances. The initiatives proposed within the growing international movement have led, on one hand, to access technical-scientific information produced worldwide and, on the other, to improvements in the visibility and recognition of the scientific production of institutions and countries in all regions.

The OA, still coexisting with traditional forms of scientific distribution, has proven -in the first two decades of the 21st century- that it can increase the efficiency and effectiveness of science as a whole. OA provides a means to review and access relevant literature and to achieve significant advances in knowledge. Furthermore, from the perspective of an individual scholar, Open Access provides the

pragmatic advantage of allowing the widest possible audience for his or her work, making it freely and easily available on the Internet, something that, as we have seen throughout this article, has been a consistent motivation in researchers (14). There is also concrete evidence that OA drives citation growth, which has an important influence on the selection of the journals in which they are published, since prestige, as we saw earlier, is often driven by the citations of their work. Thus, scholars would have a greater readership and citations. Another factor to consider is that much of the research published in journals is publicly funded, and logic dictates that if the research has already been paid for, it should not have to be paid for again in order to be reviewed. (14)

Along the way, a great deal of controversy has arisen over the need to establish how this new model should be financed. It is then that a new main factor is introduced to this story: the Article Processing Charges, or APC. The main idea behind the APC is pretty simple: to allow articles to be downloaded from the Internet as many times as desired, without any restriction, for a single payment that is attributed to the costs of the editorial processing of these articles.

OA has grown in various forms to become mainstream, but traditional editors have not yet control over this situation, largely because they still perceive that there is a monopoly of the high-impact factor journals.

The change of model seems to end up benefiting the large publishers that publish most of the world's scientific journals. In OA journals that charge APCs, the average charge for the author for publishing an article is US $ 908 (± $608 SD, N = 4418 journals), with 500 journals charging at least US $ 2000 and 12 journals charging APCs of more than US $ 4000. In a recent study, of 505.903 Open Access (OA) articles analyzed, 60,9% were published in gold OA journals, where authors pay for article processing; only 8,6% were published in diamond OA journals (no APC fees), and 30,5% in hybrid journals (fees apply for OA publications). Revenues for gold publishers amounted to US $612,5 million, while for hybrid journals, for which publishers already charge subscription fees, revenues amounted to US $448,3. (15)

This change of model has presented new challenges, especially for scholars, who have witnessed how sustainability in the business model has shifted; that is, the income from subscriptions was replaced by payments to be made by the authors themselves or by funding agencies. On the other hand, researchers from developing economies, were often unable to access knowledge in academic journals because subscription fees were unaffordable for their institutions, now find in processing fees a financial barrier to publishing their articles, especially in "prestigious" journals.

Fighting this reality, Open Access journals are emerging, in which neither the reader pays for access, nor the authors for processing or publication and, in addition, authors retain the copyright of their work and allow it to be shared and reused. This is what has been called *diamond access*, an additional category to the gold, green, and hybrid that we have already explained. These journals usually belong to academic institutions or professional societies, which are responsible for their cost and maintenance.

A study conducted in 2021, commissioned by the large Open Access group cOAlition S, and titled Study *OA Diamond Journals*, presents concrete data on the size of this growing sector. The study found that there are about 29.000 diamond OA diamond journals, that are estimated to publish 356.000 articles per year. The diamond OA sector is diverse in terms of regions (45% in Europe, 25% in Latin America, 16% in Asia, and 5% in the United States/Canada) and disciplines (60% humanities and social sciences, 22% sciences, and 17% medicine). (16)

In Europe, more than half of diamond OA journals are based in Western Europe. Most of diamond OA journals are small, publishing fewer than 25 articles a year, and serve mainly national authors (in all disciplines, including science and medicine), but their readership is mostly international. Diamond OA journals also have a higher proportion of multilingual journals (38%) in comparison with gold OA journals (14%). (16)

The variety and heterogeneity of existing journals, both geographically and linguistically, is important because it addresses one of the most critical flaws of gold OA. Diamond OA solves the problem by eliminating all costs, for both readers and researchers, but it remains important then to determine who should pay. This form of access continues to be promoted by universities and institutions that allocate resources for research. For example, there are now more than 850 universities and research organizations that have endorsed policies mandating researchers to share their work in OA.

Research funders worldwide, including the National Science Foundation in the US, the China Academy of Sciences, the European Union, and the Medical Research Council from the UK, required that research findings that result from projects funded by them must be published in compliant Open Access journals. This culminated in 2018 and was called *Plan S* (17). In this initiative, eleven European funders announced that all research findings of studies funded by their organizations must be published in full Open Access with zero-embargo. Plan S is further accelerating change towards publication in gold OA journals.

Another challenge that the Open Access movement must overcome, lies in the way scientific production is evaluated, as it is currently based mainly on the criteria associated with the impact factor described above. This is why several initiatives that aim to address the pressing need to improve the way in which funding agencies, academic institutions, and other groups evaluate scientific research, have emerged.

During the annual meeting of the American Society for Cell Biology (ASBC) that took place in San Francisco, California on September 16, 2012, a group of editors of academic journals developed a list of recommendations known as the San Francisco Declaration on Research Assessment (DORA). DORA recognizes the need for improvement in the evaluation of researchers and research findings. The signatories (22,174 individuals and organizations in 159 countries have signed up to date) are committed to using metrics in a responsible manner, which translates into "avoiding journal impact factors, H-indexes and university rankings in research and researcher evaluation". The Declaration also states that it is “imperative that scientific output is measured accurately and evaluated wisely”. (18)

In February this year (2022), the Budapest Declaration that led to the OA movement was updated (19). This new Declaration assesses the noticeable growth of the OA movement, the change of model of the scientific publications, as well as the current challenges and realities, such as the growth of journal repositories, novel forms of publication, such as preprints, the updating of funding agencies’ policies, forms of research evaluation, and improvements in the infrastructure with emerging tools available that facilitate the editorial processes in all its phases, from the reception of articles, peer review, and publication formats. From this update, it has been established that Open Access is not an end in itself, but a means to achieve other ends, but mainly it must be a means to equity, quality, usefulness, and sustainability of research.

In any case, it is true that with the increased availability of open-access publishing, there may be more papers published overall, and with that, there may be more low-quality or even fraudulent papers. However, this issue is not unique to open-access publishing, as any increase in the number of papers published could lead to more problematic papers.

To address these concerns, it is important to have robust editorial processes in place that prioritize quality and rigor. This includes careful selection of reviewers, transparent and objective decision-making criteria, and ongoing monitoring and evaluation of published work. Additionally, authors should be encouraged to follow best practices for conducting and reporting research to improve the quality of published work.

The future of scientific journals and of the new publishing model should be analyzed in terms of the advantages and disadvantages they have to fulfill the aforementioned purposes, as well as in the implementation of coherent strategies that promote the comprehensive growth of Open Access. In short, science should be considered more as a common good than a commercial good, as discussed in the next section.

A COMMON GOOD

Open science. Initiatives with that name allowed many advances in research during the SARS-CoV-2 pandemic. They opened the doors to the exchange of data and information and managed to establish solutions in such turbulent times for the planet. However, defining open science and sticking to a single concept is difficult, as it implies a lack of knowledge of the multiple paths that converge to arrive at what we know today.

First, we must recognize that open science is a movement related to OA and is based on the search for the openness of scientific research (methods, instruments, data, etc.) for the benefit of society as a whole. It is therefore a means capable of articulating and energizing science, technology, and innovation policies. Collaboration and contribution are a fundamental part of the open science concept, which also allows the generation of multidisciplinary dialogues to integrate the different actors in the research process (20). This movement aims to make science more accessible, efficient, transparent, and beneficial for everyone. It is driven by advances in the digital world; the transition to open science makes scientific information, data, and products more accessible and more easily shared with the active collaboration of all stakeholders.

But reaching this point has entailed a long journey, paradigm shifts, and necessary back-and-forth actions. The current state emerged as a result of the pressure exerted by academic institutions and governments for publicly funded research to be shared more openly, often for the purpose of accelerating social or economic growth and innovation. The arguments that were presented to achieve such goals included the following:

- The results of publicly funded research should be publicly available.
- The need to drive cultural change in research and among researchers.
- The adoption of Web-based tools and technologies to facilitate scientific collaboration.

Therefore, based on these needs and raising these paradigms, on Tuesday, October 27, 2020, the General Directors of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), and the United Nations High Commissioner for Human Rights made a joint call for Open Science, appealing to Section 27 of the Universal Declaration of Human Rights, and advocating for an open, inclusive, and collaborative science. Precisely in line with UNESCO's work, at the 40th session of the General Conference, Member States mandated the Organization to develop a Recommendation on Open Science. The document was approved in 2022 by the supreme governing body of this international organization, and the recommendations are intended to influence the development of national laws and practices.

The consensus definition of Open Science (21) adopted by the 193 signatory countries is as

follows:
Open Science is an inclusive construct that combines diverse movements and practices in order to make multilingual scientific knowledge openly available and accessible to all and reusable by all, to increase scientific collaborations and information sharing for the benefit of science and society, and to open the processes of creation, evaluation, and communication of scientific knowledge to social actors beyond the traditional scientific community. Open science encompasses all scientific disciplines and is based on the following key pillars: open scientific knowledge, open science infrastructures, scientific communication, open participation of social agents, and open dialogue with other knowledge systems.

Member States commit to *"establish regional and international funding mechanisms to ensure that all publicly funded research complies with the principles and values of open science, seen as a tool to reduce inequality between countries and the right to benefit from scientific progress."*

The document clearly states that a publication method in which immediate access to scientific publications is granted only in exchange for payment is not in line with their recommendations and that any transfer or licensing of copyright to third parties should not restrict the public's right to immediate open access to a scientific publication.

So, democratizing science and knowledge is a pending challenge and the direct consequence of considering science as a common good. We must ask ourselves, who does science seek to benefit: the authors, the journals, and institutions? or the people and the planet?

LATIN AMERICA'S SITUATION

The infrastructure built in Latin America by systems such as Redalyc (Network of Scientific Journals of Latin America and the Caribbean, Spain and Portugal) or Scielo (Scientific Electronic Library Online) puts the Latin American region, in a way, probably unthought of, at the world forefront in non-commercial open access or diamond, as this practice is currently called.

A detailed analysis of scientific publications in Latin America and the Caribbean, based on the consolidation of the records of the databases of journals indexed in SciELO and Redalyc for the period 1909-2019, identifies 1720 scientific journals in the region, a collection with almost 800,000 articles and more than 2,500,000 free consultation authors. The study highlights universities and public institutions as the entities that sustain this regional publication circuit and details that the number of journals that operate with the APC model in the region is much lower than in other continents, with Brazil being the country with the most significant weight of this practice (22). In Latin America, there is a solid, deeply rooted tradition where publications are mainly owned by universities and scientific societies, rather than by profit-oriented publishers since they are aimed at disseminating science and giving visibility to scientific production over purely commercial interests (23).

The flip side of this coin is that this choice is often not represented or perceived as increased visibility of scientific research. However, the figures show that, among the various developing regions, research is growing and becoming more visible. Latin America's contribution to the global science arsenal is increasing and is about half of the international scale in terms of production and visibility.

Latin America (in the period 2000-2010) has had a growth of more than 9% per year in its scientific production, which has translated into an increase of almost 70% in its share of world manuscripts. This corresponds to a little less than 4.4% of the world's annual production of academic articles. Citation impact for Latin America has improved by 1.6% per year but remains below the world average. Clarivate, owners of Thomson Reuters, the company that publishes the well-known rankings

that measure the impact factor, highlights in its global report that the number of academic research and papers (papers and reviews) from the region, indexed in Web of Science (WoS), has grown faster than most of the rest of the world.

From 2016 to 2020, five countries in the region (Brazil, Argentina, Mexico, Colombia, and Chile) published more than 25,000 papers registered in the Web of Science (WoS), the largest database of papers worldwide.
Another 12 published between 1,000 and 10,000 articles, and the other 17 countries in the region published less than 200 articles per year on average. Brazil is by far the largest research producer and 10 of the 34 countries, including Cuba and Mexico, account for more than three-quarters of the regional output.

This data should make us reflect on the concept of the "invisible continent", as the one with little visibility in science, in a continuous struggle to obtain "global" citations, according to the rules imposed by the prestige market. Often, what happens is that this production, which is verified, is underestimated by both the author and outsiders, since many publications are found precisely in journals that belong to a solid regional ecosystem, but are not indexed in the leading commercial databases, such as WoS or Scopus (24,25).

CONCLUSIONS

Academic publications have had a rich history on their way to establishing themselves as the preferred vehicle for scientific communication. For a long time, this path did not receive much questioning since its main objective was to make known and validate among peers the scientific findings produced by the academic community, which was usually small, despite the influence of some of its members.

The natural evolution of the sector turned the production of scientific publications into a real industry since the middle of the 20th century, and its raw material has always been the knowledge generated by the different academic societies and groups. However, this distribution of knowledge developed as an industry with a clear market vision strongly focused on creating around this product the conditions of a good mainly driven by prestige.

Publishing went from the need to communicate knowledge to making research visible to a wider public, giving individual prestige in return to those who did it. This allowed journals to validate those who produced better knowledge for humanity, based on the citations that these authors were able to obtain within the community and the place where they managed to publish their findings; the latter was called impact. Publish or perish became a rule, a silent law, not written in this way, but which regulated the growth of the scientific community through promotions and awards for communicating knowledge in a "prestigious" journal where there was a greater probability of achieving impact.

Technology has changed everything. Today, like in many other sectors, the technological revolution has lowered the access barriers to the scientific publications market, showing that the original intention of freely disseminating the results of research conducted with the scientific method, and validated by peers, can be accessible, without barriers, not only to the academic community but also to the general public. In this way, the knowledge immersed in each publication and the science behind it is increasingly consumed and shared.

Thus, we find ourselves, once again, facing the struggle of the past against the present, and innovations often end up coexisting, as well as old and new forms. The STM or scientific journal industry has been transforming its publication and maintenance model - which used to work by means of payment of subscriptions through scientific societies, organizations, and bookstores - by

charging for the processing of articles to authors or sponsoring entities. This change was motivated, in principle, by the altruistic desire to offer knowledge without access barriers, now not only to the scientific community where it is generated but to the whole world. This last vision seems to be collapsing as data shows that large corporations have managed to circumvent technological changes to leverage the new movements in their favor. This should not be surprising if we consider the inexhaustible resources and know-how that the industry has forged through the ages.

Advocates of corporate open access see it as a pragmatic way to open research to the masses. But others see the new model as a corruption of the original vision, which will continue to funnel billions of dollars to large publishers, marginalize scientists in low-income countries, and fail to solve deeper systemic problems in scientific publishing. (23,26)
Currently, perhaps the greatest experience that can be highlighted regarding an alternative system to the existing publishing models in the world is in Latin America. Over the last 20 years, the region has been consolidating the model now known in other parts of the world as "diamond open access". This model, in its pure state, corresponds to that initial desire to make visible the production of knowledge by individuals, organizations, and countries and has shown that it is possible with the funding of all those who believe that science should be a common good. A model that has been gaining a great international reputation and is presented as a real alternative to saving us from the pay-to-publish model and its iniquities, at least in our region (23).

What should be the purpose of researching and publishing science? The answers to this question may be diverse, as it depends on whom we ask. However, realistically, it is most likely that open access will end up predominating, responding more to the needs of the rich and dominant publishing industry that, with the different labels, has been building access barriers that can only be broken down with payments based on the prestige market and its knowledge of the sector. If this is what ultimately happens, it will be a missed opportunity.

Ideally, the different visions should coexist, and the models should complement each other. We do not see an ethical problem in a publishing model is sustainable over time, but we cannot allow the rules of the system to be dictated solely by profit-seeking oligopolies, or for it to be based on a prestige market.

In this sense, it is the responsibility of the funding agencies, of the organizations and institutions that own the journals, and also of the authors, to ensure that science is a common good and that there is a balance in communicating its advances and findings. The evaluation criteria for journals should be broad, comprehensive, and inclusive in global terms. It would be necessary to change the prestige market with its extra costs, for a more transparent market that allows sustainability and universal expression of scientific knowledge at the same level or from the appropriate perspective for each geographical area.

The next time we are choosing where to publish or fund research, if we stop to think about the system of science distribution that we would like to encourage in the future, whatever our perspective , whether that of a simple knowledge transaction or a contribution to the common good of humanity- this article will have achieved its goal.

Interest conflict

Dr. Caballero is the Editor-in-Chief of Global Rheumatology

Financing

By the authors

REFERENCES

1. https://www.uclpress.co.uk/collections/ro_homepage_products/products/187262

2. Bywaters EG. History of Books and Journals and Periodicals in Rheumatology. *Ann Rheum Dis.* 1991 Jul;50(7):512-6. doi: 10.1136/ard.50.7.512. PMID: 1877861; PMCID: PMC1004471.

3. Caballero-Uribe CV. Editor. *La evolución de PANLAR a través de su historia.* PANLAR 2018. Available: http://www.panlar.org/sites/default/files/historia_de_panlar_75_anos_digital.pdf

4. Cox B. The Pergamon phenomenon 1951-1991: Robert Maxwell and scientific publishing [Internet]. Vol. 15, Learned Publishing. Wiley; 2002. p. 273–8. Available from: https://doi.org/10.1087/095315102760319233

5. Larivière V, Haustein S, Mongeon P (2015) The Oligopoly of Academic Publishers in the Digital Era. PLoS ONE 10(6): e0127502. https://doi.org/10.1371/journal.pone.0127502

6. Wouters P. Eugene Garfield (1925–2017). *Nature* 543, 492 (2017). https://doi.org/10.1038/543492a

7. Khoo S. Y.-S. (2019). Article Processing Charge Hyperinflation and Price Insensitivity: An Open Access Sequel to the Serials Crisis. LIBER Quarterly: *The Journal of the Association of European Research Libraries*, 29(1), 1–18. https://doi.org/10.18352/lq.10280

8. Herbert R. Accept Me, Accept Me Not: What do Journal Acceptance Rates Really Mean? [ICSR Perspectives] (February 15, 2020). International Center for the Study of Research Paper No. Forthcoming, Available at SSRN: https://ssrn.com/abstract=3526365 or http://dx.doi.org/10.2139/ssrn.3526365

9. Brembs B (2019) Reliable novelty: New should not trump true. PLoS Biol 17(2): e3000117. https://doi.org/10.1371/journal.pbio.3000117

10. Jurchen S. (2020) Open Access and the Serials Crisis: The Role of Academic *Libraries, Technical Services Quarterly*, 37:2, 160-170, DOI: 10.1080/07317131.2020.1728136

11. Budapest Open Access Initiative - Read the declaration [Internet]. Budapestopenaccessinitiative.org. Available from: https://www.budapestopenaccessinitiative.org/read/

12. Berlin Declaration [Internet]. Mpg.de. [citado el 26 de octubre de 2022]. Available from: https://openaccess.mpg.de/Berlin-Declaration

13. Bethesda Statement on Open Access Publishing [Internet]. Harvard.edu. Available from: https://dash.harvard.edu/bitstream/handle/1/4725199/Suber_bethesda.htm

14. Pearce JM. The Rise of Platinum Open Access Journals with Both Impact Factors and Zero Article Processing Charges. Knowledge 2022; 2:209–24. https://doi.org/10.3390/knowledge2020013.

15. Butler L, Matthias L, Simard MA, Mongeon Ph,

Haustein S. (2022). The Oligopoly's Shift to Open Access. How For-Profit Publishers Benefit from Article Processing Charges (Version v1). Zenodo. https://doi.org/10.5281/zenodo.7057144

16. Diamond Journals Study. Part 1: Findings. Zenodo. https://doi.org/10.5281/zenodo.4558704

17. Else H. A guide to Plan S: The Open-Access Initiative Shaking Up Science publishing [Internet]. Nature. Springer Science and Business Media LLC; 2021. Available from: https://doi.org/10.1038/d41586-021-00883-6

18. Hazlett H. DORA and the new Agreement on Reforming Research Assessment [Internet]. DORA. The Declaration on Research Assessment (DORA); 2022. Available from: https://sfdora.org/2022/09/21/dora-and-the-new-agreement-on-reforming- research-assessment/

19. BOAI20 Spanish translation [Internet]. Budapestopenaccessinitiative.org. Available from: https://www.budapestopenaccessinitiative.org/boai20/boai20- spanish-translation/

20. Reichmann S, Wieser B. Open Science at the Science–Policy Interface: Bringing in the Evidence? *Health Res Policy Sys* 20, 70 (2022). https://doi.org/10.1186/s12961-022-00867-6

21. Draft Recommendation on Open Science (full text) Available from: https://unesdoc.unesco.org/ark:/48223/pf0000378841

22. Beigel F, Packer A L, Gallardo O, & Salatino M (2022). OLIVA: A Transversal Analysis of Indexed Scientific Production in Latin America. Disciplinary Diversity, Institutional Collaboration, and Multilingualism in SciELO and Redalyc. *In SciELO Preprints*. https://doi.org/10.1590/SciELOPreprints.2653

23. Alperin J P (2022, October 12). Why I Think Ending Article-Processing Charges Will Save Open Access. Nature. Springer Science and Business Media LLC. http://doi.org/10.1038/d41586-022-03201-w

24. Latin America: South and Central America, Mexico, and the Caribbean – Clarivate. Available from https://clarivate.com/lp/latin-america-south-and-central-america-mexico-and-the- caribbe an/

25. Van Noorden R. The Impact Gap: South America by the numbers. Nature 510, 202–203 (2014). https://doi.org/10.1038/510202a

26. Mering M (Contributor) & Hoeve C D (2020) A Brief History to the Future of Open Access, Serials Review, 46:4, 300-304, DOI: 10.1080/00987913.2020.1850041 10.1080/00987913.2020.1850041

GLOBAL
RHEUMATOLOGY
BY PANLAR

globalrheumpanlar.org