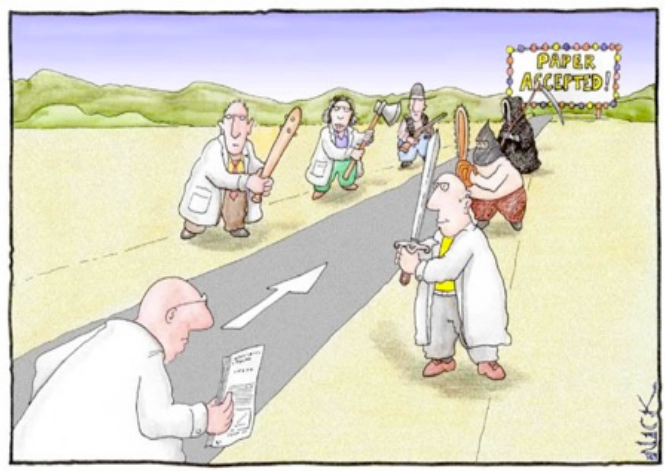
Public Access to Scientific Literature: The (Long and Bumpy) Road to Open Science

Seminar
January 27, 2021



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

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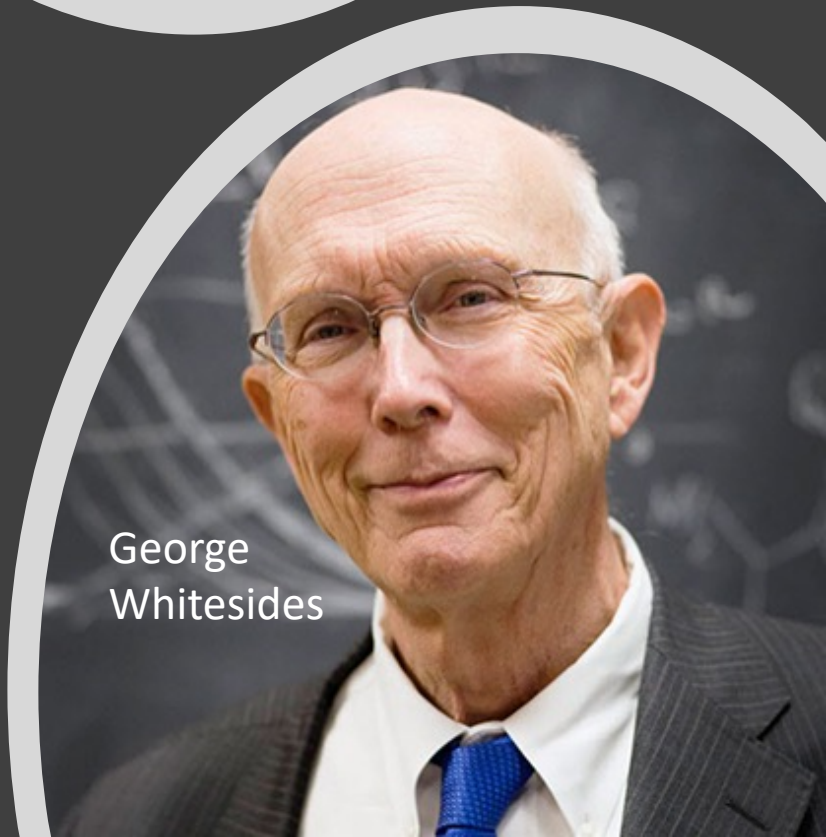
ACS APPLIED MATERIALS & INTERFACES

What is Scientific Publishing and Why do Scientists Publish?

- "**A paper is an organized description of hypotheses, data and conclusions, intended to instruct the reader**. If your research does not generate papers, it might just as well not have been done" (G. Whitesides, Adv. Mater., 2004, 16, 1375)
- **"if it wasn't published, it wasn't done"** - in E.H. Miller 1993

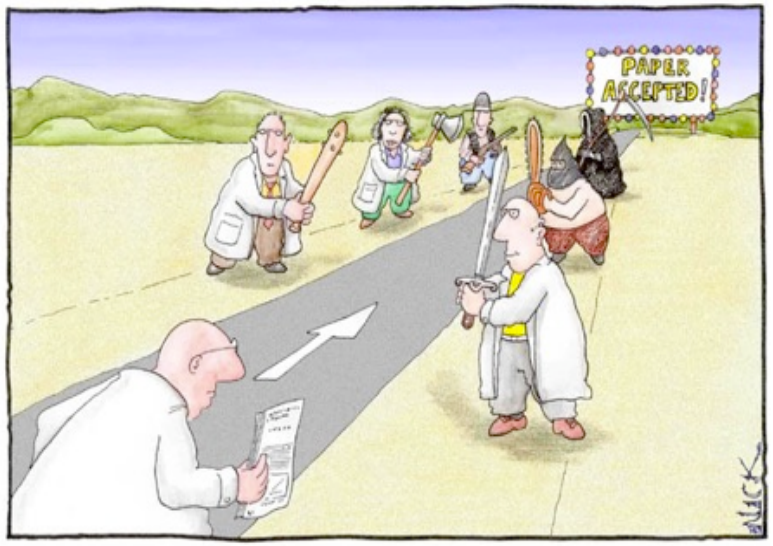


What is Peer Review?

Peer-review is the evaluation of work by people with relevant expertise and interests and is intended to determine a manuscript's relevance and suitability for publication while upholding scientific integrity.

Scrutiny by scientific peers is an invaluable step in the publication process and helps maintain a high standard for published research.

Pay it forward: As a research active member of the scientific community, participating in peer-review is an important way to engage with others in your area of expertise.



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

Cartoon by Nick D Kim, strange-matter.net

Scientific Communication – Traditional Approaches - I

Publish in traditional subscription journal

JACS
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nature

Science

Chemical Science
ROYAL SOCIETY OF CHEMISTRY
PERSPECTIVE
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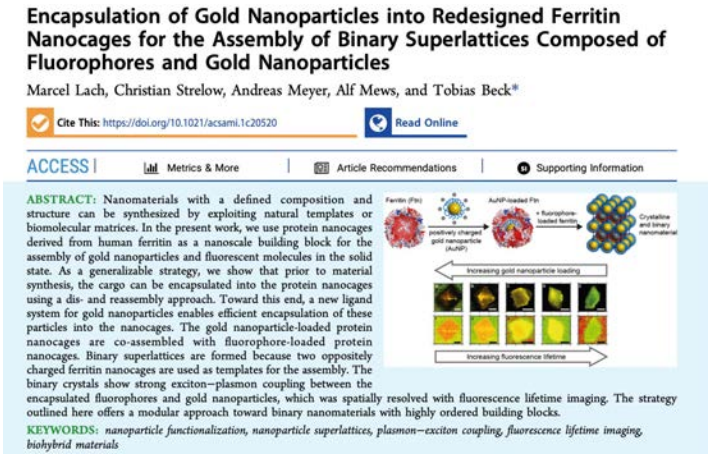
Check for updates
Engineering and characterization of interphases for lithium metal anodes


Encapsulation of Gold Nanoparticles into Redesigned Ferritin Nanocages for the Assembly of Binary Superlattices Composed of Fluorophores and Gold Nanoparticles

Marcel Lach, Christian Strelow, Andreas Meyer, Alf Mews, and Tobias Beck*

Cite This: https://doi.org/10.1021/acsami.1c20520 Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: Nanomaterials with a defined composition and structure can be synthesized by exploiting natural templates or biomolecular matrices. In the present work, we use protein nanocages derived from human ferritin as a nanoscale building block for the assembly of gold nanoparticles and fluorescent molecules in the solid state. As a generalizable strategy, we show that prior to material synthesis, the cargo can be encapsulated into the protein nanocages using a dis- and reassembly approach. Toward this end, a new ligand system for gold nanoparticles enables efficient encapsulation of these particles into the nanocages. The gold nanoparticle-loaded protein nanocages are co-assembled with fluorophore-loaded protein nanocages. Binary superlattices are formed because two oppositely charged ferritin nanocages are used as templates for the assembly. The binary crystals show strong exciton−plasmon coupling between the encapsulated fluorophores and gold nanoparticles, which was spatially resolved with fluorescence lifetime imaging. The strategy outlined here offers a modular approach toward binary nanomaterials with highly ordered building blocks.

KEYWORDS: *nanoparticle functionalization, nanoparticle superlattices, plasmon−exciton coupling, fluorescence lifetime imaging, biohybrid materials*

Advantages:

- ***Well refined system of peer-review – improves and validates research***
- ***No fees required to publish (Free to author!)***
- ***The final published paper is generally high quality and polished***
- ***Wide dissemination to global audience***
- ***Discoverable - Covered by large indexing systems (Google, Web of Science, Scopus)***

Disadvantages:

- ***Substantial time required for peer-review process***
- ***Not easily accessible to general public***
- ***Universities bear cost of publishing through subscription fees***
- ***As subscription fees increase, accessibility may decrease***


Berkeley Library NEWS
UNIVERSITY OF CALIFORNIA

More News

In the news: University of California splits with Elsevier, the world's largest scientific publisher

Scientific Communication – Traditional Approaches - II

Attend Scientific Meeting: Give talk or poster

GRC® | Frontiers of Science

Advantages:

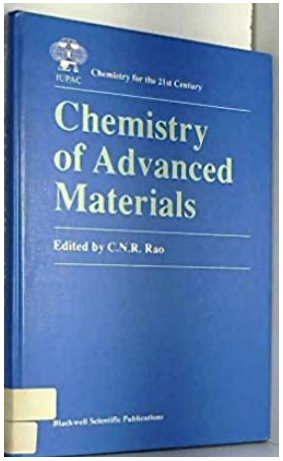
- ***Reach an audience of peers and specialists in the field***
- ***Get immediate feedback***
- ***Meet competitors in person***
- ***Engage possible collaborators in person***
- ***Timely dissemination of results***

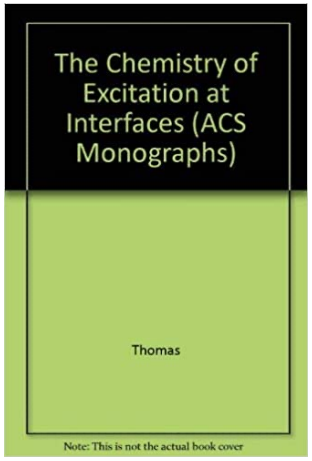
Disadvantages:

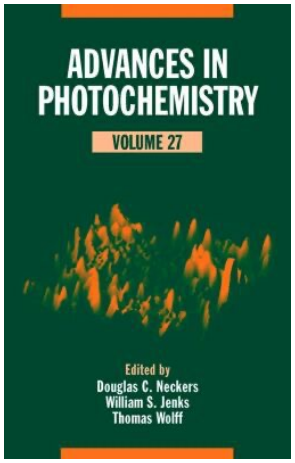
- ***Not easily accessible to general public***
- ***High cost of attendance: Registration, travel, daily expenses***
- ***Limited audience***
- ***Difficult to provide details of research results (supporting information)***

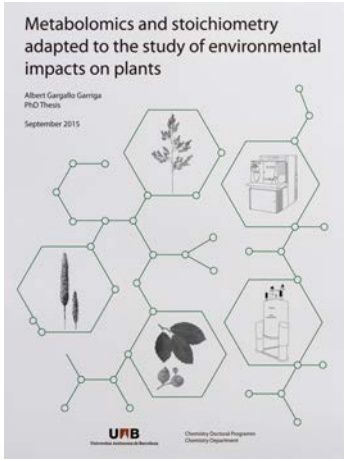
Scientific Communication – Traditional Approaches - III

Monograph Books, Edited Books and Thesis









Advantages:

- ***Reach an audience of peers and specialists in the field***
- ***Comprehensive coverage of a topic***
- ***Opinion can be expressed by author(s)***

Disadvantages:

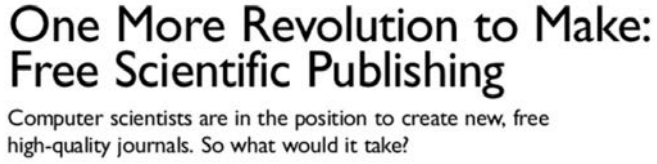
- ***Often not peer reviewed***
- ***Not easily accessible to general public***
- ***Limited audience for author***
- ***Often not indexed by major indexing services***
- ***Slow to publication (1 – 2 years often required)***
- ***Difficult to provide details of research results (supporting information)***

Modern Evolution of Scientific Publishing

- *Advances in Technology (i.e., the internet) has driven a rapid rise to non-traditional approaches to publishing*

- *These advances have driven the move towards "Open Science" and have put significant pressure on traditional science publishers (Elsevier, Wiley, Nature Publishing Group, ACS Publications, etc)*

- *Preprint Servers for author-driven publication*
- *Agency and Government Archives (PubMed)*
- *Open Access Journals*
- *Web Publication – e.g., institutional and Library archives*
- *Pirate server websites – e.g. Scihub, ResearchGate*
- *Free to share copyright licenses (CC-By)*


One More Revolution to Make: Free Scientific Publishing

Computer scientists are in the position to create new, free high-quality journals. So what would it take?


MedCrave

MOJ Proteomics & Bioinformatics

Revolution and Evolution of Scientific Publishing

Accusations of fraud spur a revolution in scientific publishing

Three and a half centuries after the first journal was published, post-publication peer review is shaking up the old system

Journals need to get used to the idea that in future peer review of papers will take place after publication as well as before. Photograph: Getty

What is Open Science?

- Movement to make primary research freely available
- Goal of accelerating discovery
- Way to combat the “reproducibility crisis”
- Supported by growth in technology

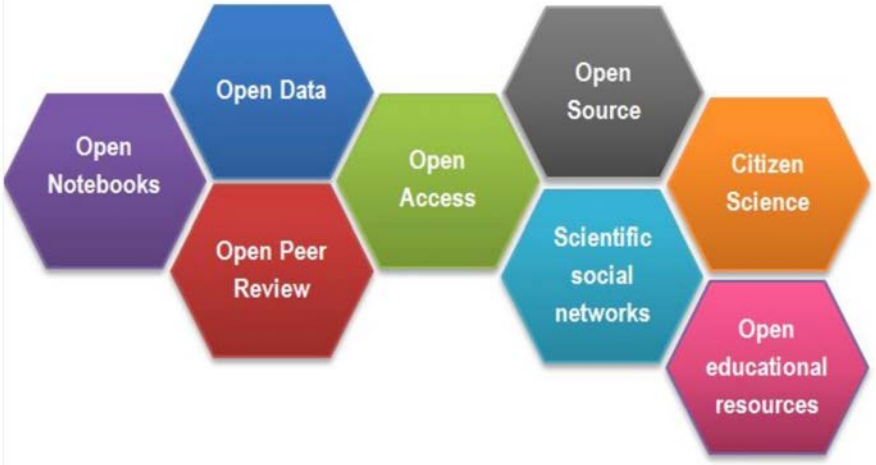


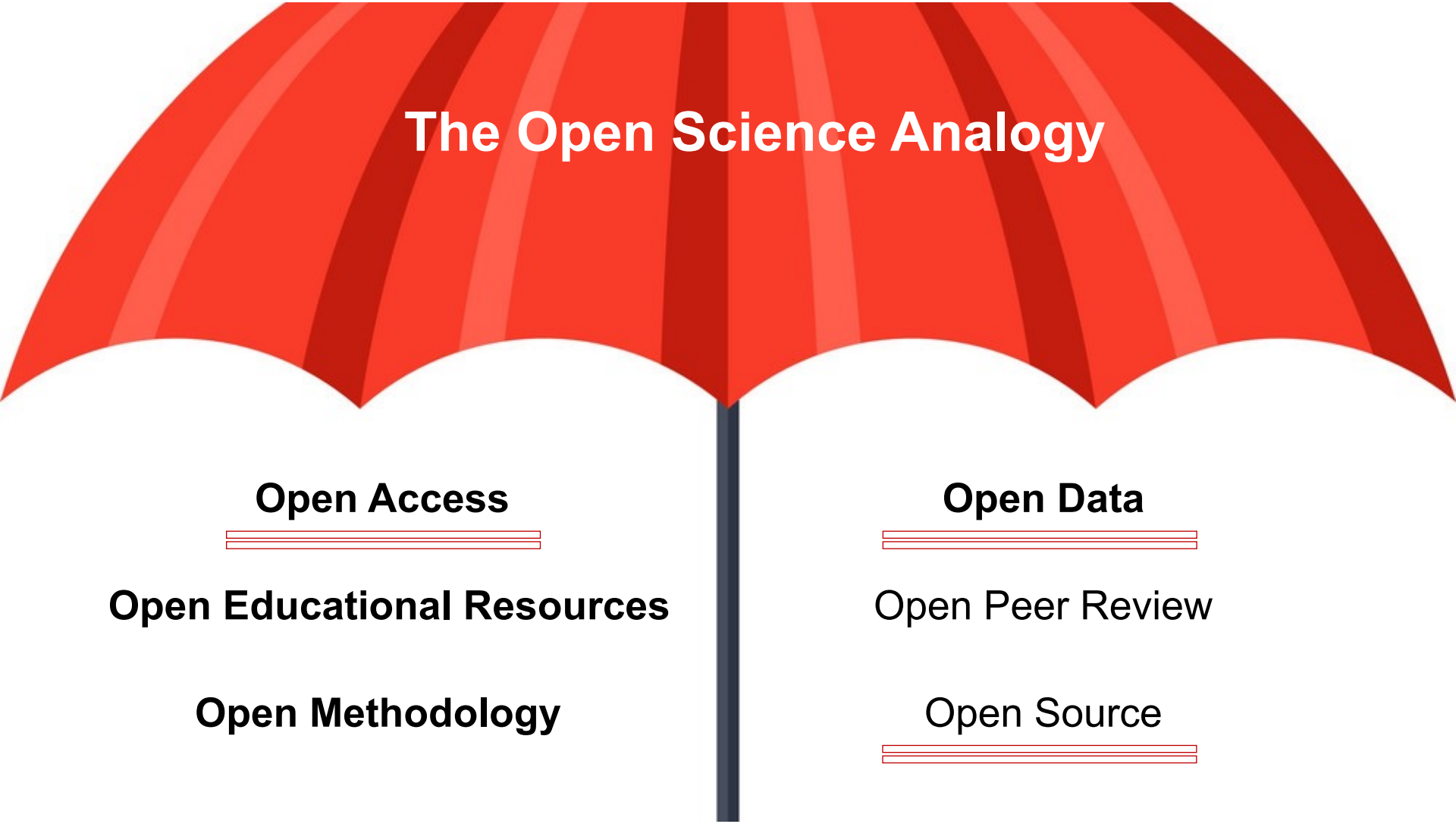
Fig. 1 Open Science facets as a beehive
Science 2.0: Science in Transition’ (European Commission, 2015).

Why Does Open Science Matter?

Researchers and librarians must address funder and Institutional mandates that specifically address open science goals

Some tenets include:

- **Reproducibility**
- **Discoverability**
- **Transparency**


The Open Science Analogy
Open Access
Open Educational Resources
Open Methodology
Open Data
Open Peer Review
Open Source

Institutional and Funder Mandates Drive the Transition to Open Access

- Many Institutions have implemented voluntary or required open access posting requirements for their faculty, staff and students

- Some Funding Agencies (NIH, DOE, NSF, EC Funders) require that all research carried out under their funding be made available open access

CaltechAUTHORS
A Caltech Library Service

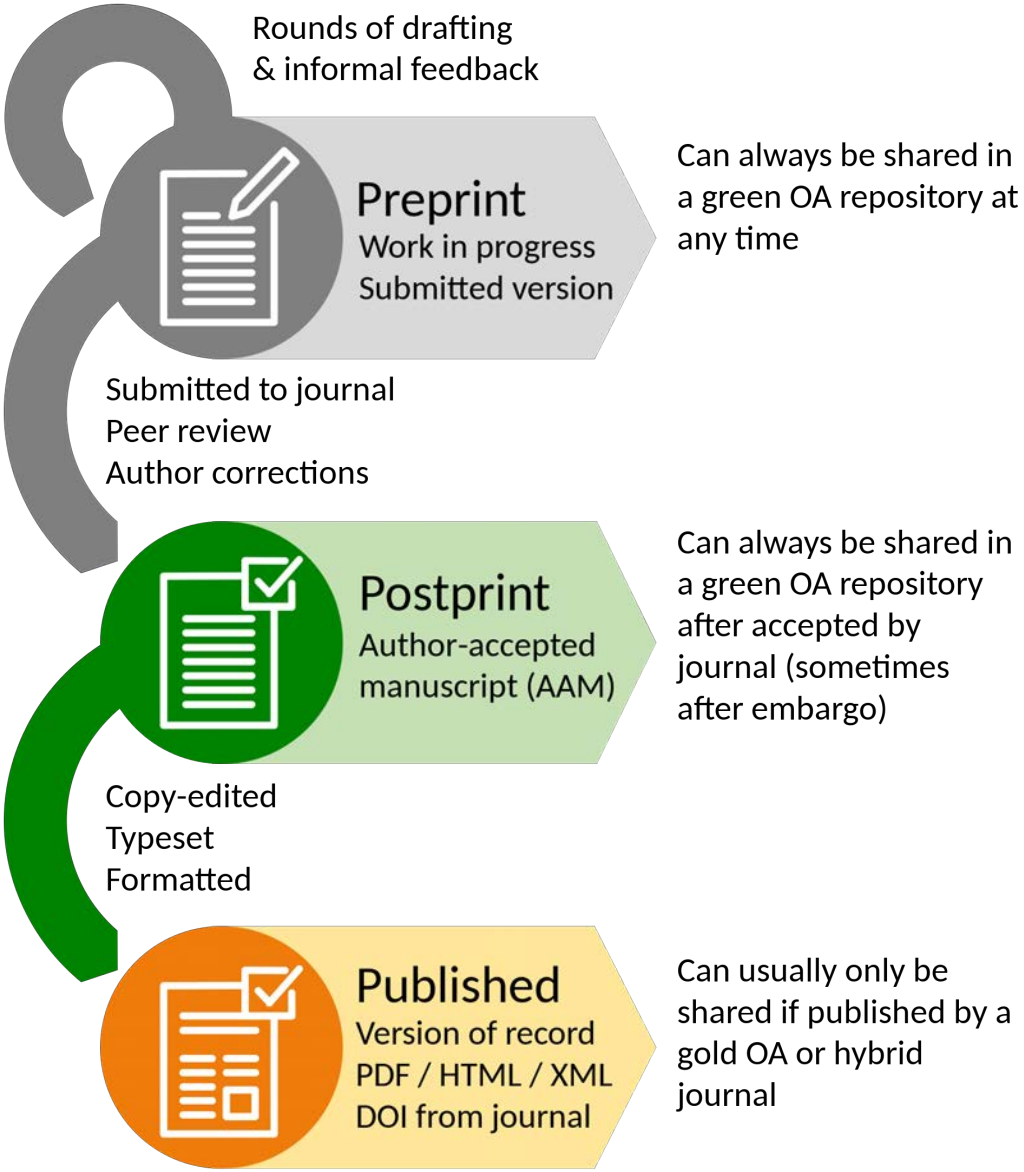
DIGITAL ACCESS TO SCHOLARSHIP AT HARVARD

eScholarship
University of California

PubMed.gov

Plan S
Making full & immediate Open Access a reality

Different Categories of Open Access Publication



Open Access Publishing. I. Preprint Servers.

arXiv.org

ChemRxiv™

Research Square

bioRxiv beta
THE PREPRINT SERVER FOR BIOLOGY

medRxiv
THE PREPRINT SERVER FOR HEALTH SCIENCES

Advantages:

- ***Author-driven publication***
- ***Fully open access. Public and scientific peers can read full text***
- ***Rapid dissemination. Full text is available within several days***
- ***Comprehensive coverage of a topic***
- ***Opinion can be expressed by author(s)***

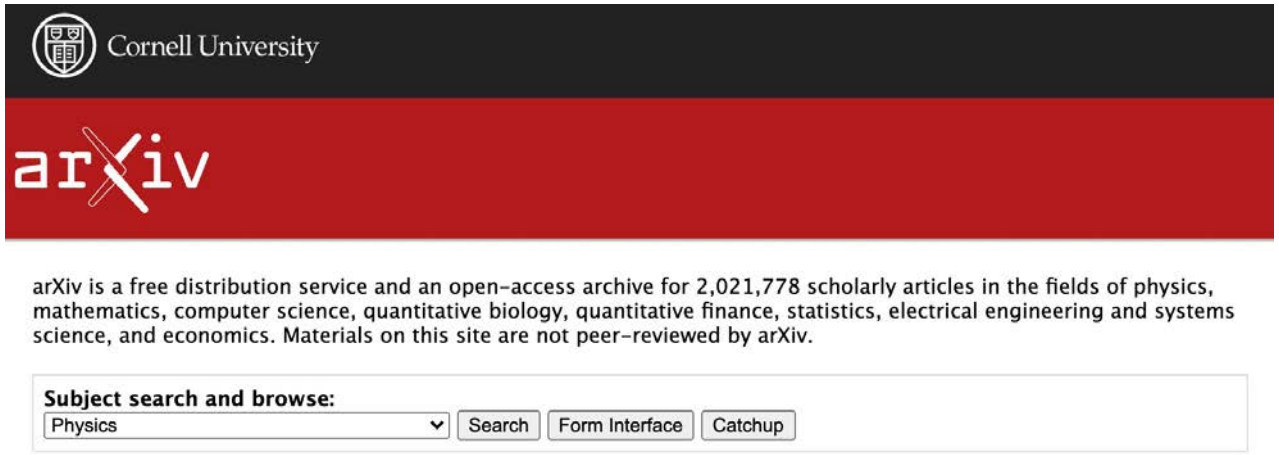
Disadvantages:

- ***Not peer reviewed***
- ***Not Indexed***
- ***Results may be incorrect or incomplete***
- ***Incorrect results can be spread by media***
- ***Future costs/burden of archiving?***

https://en.wikipedia.org/wiki/List_of_preprint_repositories

https://v2.sherpa.ac.uk/opendoar/

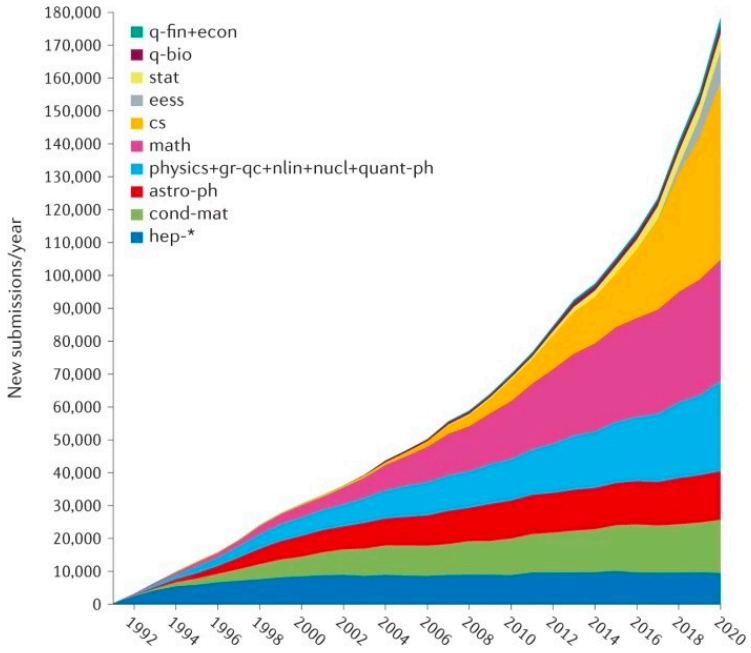
Preprint Servers – ArXiv the Original Server



https://arxiv.org

- ***Started in 1991 by Los Alamos National Laboratory***
- ***TeX format enabled automatic uploading and posting of submitted documents***
- ***Access via WWW started in 1993***
- ***Currently hosts > 2 M articles (2022)***

https://arxiv.org/



Preprint Servers – ChemRxiv Recent Addition Supported by Major Chemical Societies

https://chemrxiv.org

- ***Open for submissions in 2017***
- ***Most ACS Journals now support pre-print publication prior to submission***
- ***Currently hosts > 15 k articles (2022)***

Most Read

Organic Chemistry

The CryoEM Method MicroED as a Powerful Tool for Small Molecule Structure Determination

Christopher G. Jones, Michael W. Martynowycz, Johan Hattne, Tyler J. Fulton, B...

14,192 Downloads

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ACS Chemistry for Life®

CCS 中国化学会 CHINESE CHEMICAL SOCIETY

THE CHEMICAL SOCIETY OF JAPAN

GDCh GESELLSCHAFT DEUTSCHER CHEMIKER

ROYAL SOCIETY OF CHEMISTRY

Open Access Publishing. II. Author Accepted Manuscript Posting on Institutional Repositories

PubMed.gov

Europe PMC

eScholarship
University of California

- *Open Access publication of peer reviewed content*
- *Fully open access. Public and scientific peers can read full text*
- *Articles posted have been peer reviewed, but are in original format*
- *Papers have not been proofed and typeset by publisher/technical editor*
- *Papers are often linked to the final published content (at publisher website). However, those versions may be behind subscription paywalls*
- *Some large repositories are indexed (e.g. Web of Science)*

Advantages:

- *Author-driven publication*
- *Fully open access. Public and scientific peers can read full text*
- *Peer reviewed*

Disadvantages:

- *Papers are not in final, published form*
- *Discoverability is limited*

Open Access Publishing. III. Publication in Open Access Journals

- *Plos One was launched in 2006 with goal to make biomedical research fully open access*
- *Papers are subjected to editorial and/or peer-review prior to publication*
- *Papers are not to be excluded on the basis of lack of perceived importance or adherence to a scientific field (novelty or significance is not judged)*
- *Papers are available for community-based open peer review involving online annotation, discussion, and rating*
- *Article Processing Charge (APC) supports the cost of publication. At Plos One APC is $1750 (04/2021)*
- *Plos One articles are indexed by Science Citation Index (Web of Science)*

Open Access Publishing. III. Publication in Open Access Journals

nature communications

ACS OMEGA

Science Advances

RSC Advances

RSC Advances

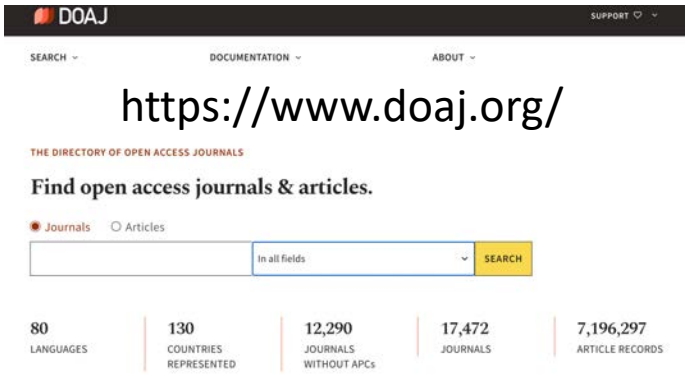
ChemistryOpen

Advantages:

- ***Peer Reviewed and Technical Editing***
- ***Published by Society or Commercial Publisher in "Journal Format"***
- ***Open Access – Free to read by general public, enhances discoverability***
- ***Publisher accepts responsibility of archival access to content***

Disadvantages:

- ***Article Processing Charge Required***
- ***Society Publishers fees range from $2,000 - 4,000 USD***
- ***Commercial Publishers can charge as much as $6,000 for APC***



Open Access Publishing. IV. Predatory Journals

"Predatory journals and publishers are entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial and publication practices, a lack of transparency, and/or the use of aggressive and indiscriminate solicitation practices."

https://www.nature.com/articles/d41586-019-03759-y

Illustration by David Parkins

- ***Deviation from best editorial and publication practices***
- ***Lack of transparency***
- ***Aggressive, indiscriminate solicitation***
- ***Journals are supported by APC***
- ***The essence of "pay to publish"***

[Polymers, IF 4.329] Submission Invitation from Topic Editor UTSA E-Mail ×

Lusi Zou <lusizou01@gmail.com> Mon, Feb 14, 1:43 AM (10 days ago)
to Polymers, bcc: kirk.schanze

Dear colleague,

As the topic editor of an open access journal "Polymers", (ISSN 2073-4360; IF: 4.329, ranking 18/88 (Q1) in polymer science), given your renowned expertise and significant contributions to the field of polymers, I would like to invite you to contribute a paper (article/communication/review/perspective) to below special issues **with 10% discount of APC**.

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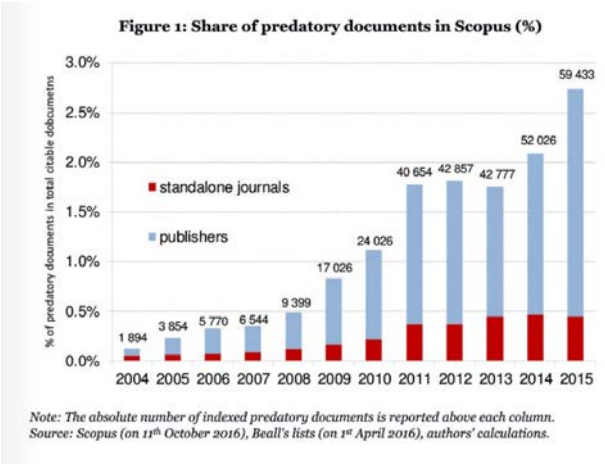


ISSN: 2687-8097

Scientific Journal of Research and Reviews

DOI: 10.33552/SJRR.2020.02.000540

Iris Publishers

Research Article

What's the Deal with Birds?

Daniel T. Baldassarre*

Department of Biological Sciences, SUNY Oswego, USA

***Corresponding author:** Daniel T. Baldassarre, Department of Biological Sciences, SUNY Oswego, Oswego, NY 13126, USA.

Received Date: March 25, 2020

Published Date: April 01, 2020

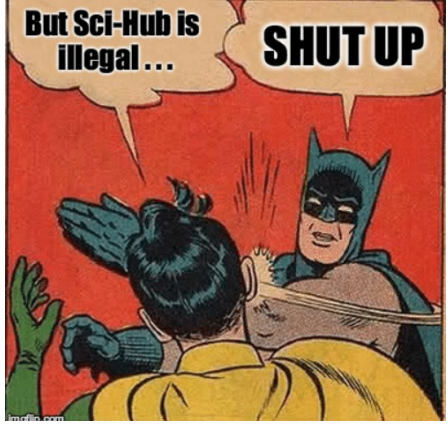
Abstract

Many people wonder: what's the deal with birds? This is a common query. Birds are pretty weird. I mean, they have feathers. WTF? Most other animals don't have feathers. To investigate this issue, I looked at some birds. I looked at a woodpecker, a parrot, and a penguin. They were all pretty weird! In conclusion, we may never know the deal with birds, but further study is warranted.

Keywords: birds, ornithology, behavior, phenotype, WTF, genomics, climate change

Abstract: "Many people wonder: what's the deal with birds? This is a common query. Birds are pretty weird. I mean, they have feathers. WTF? Most other animals don't have feathers. To investigate this issue, I looked at some birds. I looked at a woodpecker, a parrot, and a penguin. They were all pretty weird! In conclusion, we may never know the deal with birds, but further study is warranted."

Predatory Repositories. SciHub, ResearchGate



SciHub:

- ***Started in 2011 to provide access to copyrighted technical publications***
- ***Some articles obtained by scraping .pdfs from university sites that pay subscriptions***
- ***Violates author and publisher copyrights***
- ***Has been sued multiple times by major publishers (Elsevier, Wiley, ACS)***

ResearchGate:

- ***Promoted as a social network for researchers (Napster for science)***
- ***Authors are encouraged to upload their copyrighted works to share on the network***
- ***Site also scrapes postings from pre-print servers when CC-By copyright provided by authors***
- ***Often postings violate author and publisher copyrights***
- ***ResearchGate has been sued by publishers for violation of copyrights***

Different ”Flavors” of Open Access Publications offered by Commercial Publishers

Green vs. Gold Open Access

“Gold open access is where an author publishes their article in an online open access journal. In contrast, green open access is where an author publishes their article in any journal and then self-archives a copy in a freely accessible institutional or specialist online archive known as a repository, or on a website.”

Hybrid Open Access

- ***Author selects to make an article open access in a journal that is a traditional subscription-based journal***

Fully Open Access

- ***All articles published in the journal are open access (free to read by the public)***

ACS OME

PLOS ONE

nature communications

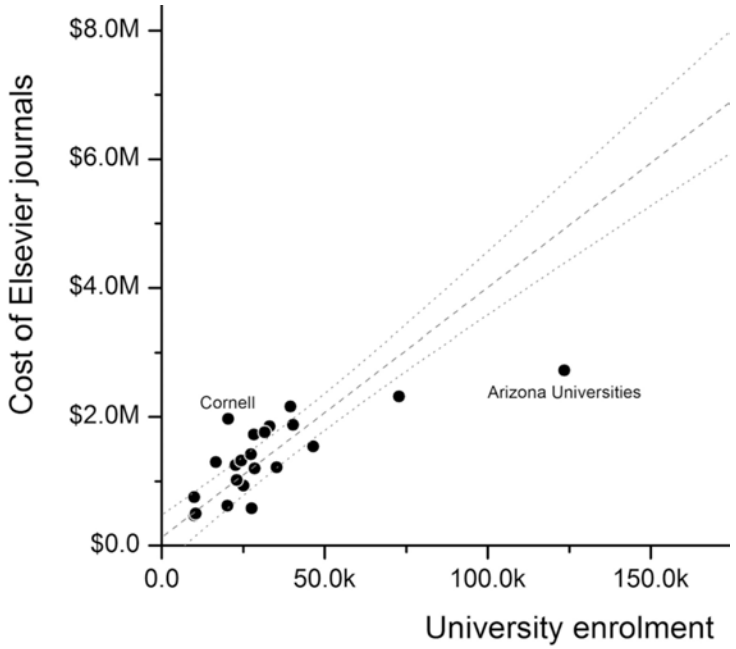
Scientific Publishing. Who Pays the Cost?

Traditional Subscription Based Access:

- ***Institutions or individual scientists subscribe to receive copy of print issue***

Transition to On-Line (Yr ~ 2000):

- ***Institutions subscribe to receive on-line access for their community***
- ***Back issues (archive) are sold separately, and at a premium***
- ***Push to sell entire "portfolio" offered by the publisher – Prices skyrocket***



Commercial and Scientific Publishing. Who Pays the Cost of Publishing in the Open Access World?

Model 1: Authors Pay the APC

- *Typical cost of publication of a peer-reviewed technical paper is $1,500 – 2,500 per article*
- *Society journals are matching APCs with cost for society members (discounts provided)*
- *Private publishers are seeking a premium on their "named High Impact journals"*
- *Nature (Hybrid) -> $11,000*
- *Nature Communications (OA) -> $5,000*

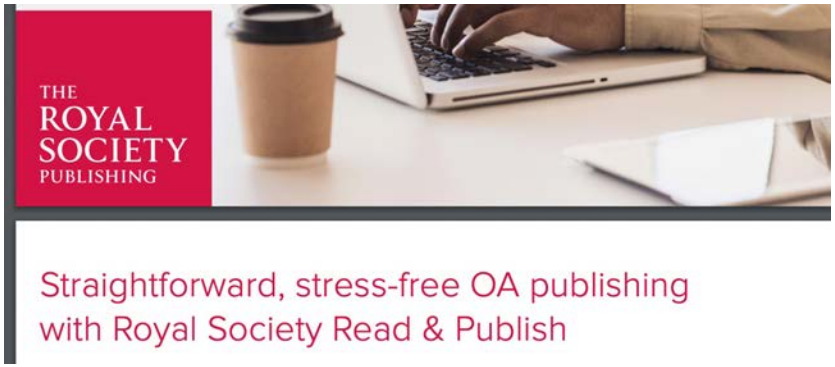
Problems Associated with Author Pays

- *Many scientists, especially in under-represented regions and at underrepresented institutions cannot afford pay to publish. Introduces strong bias in who can publish*
- *The APC introduces the notion that papers can be published if the fee is paid, regardless of the quality or originality of the science*

JOURNAL	PUBLISHER	HYBRID OR FULLY OPEN ACCESS	ARTICLE PROCESSING CHARGE
Angewandte Chemie International Edition	Wiley for the German Chemical Society	Hybrid	$5,000
Cell Reports Physical Science	Cell Press, part of Elsevier	Full	$5,200
Chem	Cell Press, part of Elsevier	Hybrid	$5,200
ChemComm	Royal Society of Chemistry	Hybrid	$2,150[a]
Chemical Science	Royal Society of Chemistry	Full	$2,150[a]
Chinese Chemical Letters	Elsevier for the Chinese Chemical Society	Full	$300[b]
JACS Au	American Chemical Society	Full	$5,000
Journal of the American Chemical Society	American Chemical Society	Hybrid	$5,000
Nature	Springer Nature	Hybrid	$11,390
Nature Chemistry	Springer Nature	Hybrid	$11,390
Nature Communications	Springer Nature	Full	$5,560
PLOS Biology	PLOS	Full	$3,000
Proceedings of the National Academy of Sciences of the United States of America	National Academy of Sciences	Hybrid	$4,700
Science Advances	American Association for the Advancement of Science	Full	$4,500
Science China Chemistry	Science China Press and Springer Nature	Hybrid	$3,860

From Chem. Eng. News

Who Pays the Cost of Publishing in the Open Access World? The "Read & Publish" Model



Max Planck Institutions Publish and Read Pilot
Corresponding authors at any Max Planck institution are eligible to publish open access and for the APC to be covered centrally by Max Planck Digital Library. This applies to all articles ***submitted*** *between 1 January and 31 December.*

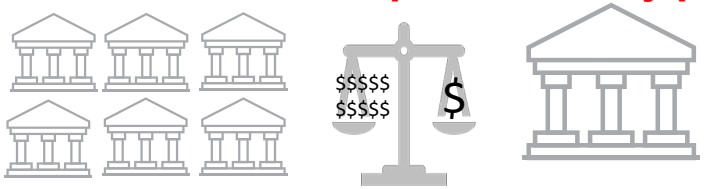
University of California shared funding model
Corresponding authors at the nine eligible UC institutions can publish open access and the APC will be split between the UC library and the author where they have funding. This applies to all articles ***accepted*** *between 1 January and 31 December.*

Benefit

- ***Authors at R&P Institutions can publish OA without APC***

Disadvantage

- ***The model may not be able to sustain, since it only benefits large institutions that publish many papers. Little benefit to smaller institutions that do not publish many papers***



Plan S: A Major Driver for Publishers to Shift to Open Access

Plan S
Making full & immediate Open Access a reality

Plan S – Launched in 2018

- *Consortium of national research agencies and funders from twelve European countries*
- *Requires scientists and researchers who benefit from state-funded research organizations and institutions to publish their work in open repositories or in journals that are available to all by 2021*
- *The mandate of Plan S will cover about 6% of worldwide research articles*

- *Not surprisingly, Plan S was met with significant push-back from global scholarly publishing industry*

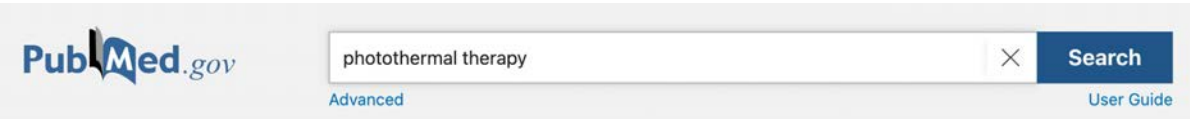
Plan S Tenets

- *Authors retain copyright*
- *Publication fees should be covered by the funders or universities, not individual researchers*
- *Publication fees should be standardized and capped*
- *Hybrid open-access journals are not compliant*
- *All current subscription journals are no longer accessible to Plan S compliant institutions!*

Part I: The Plan S Principles

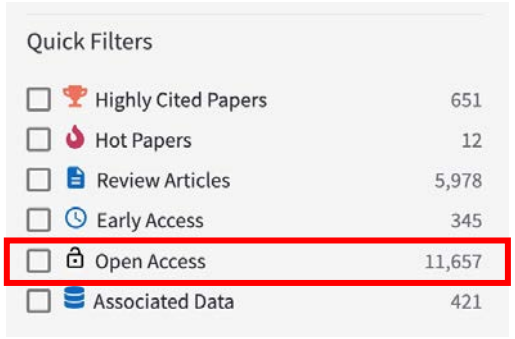
"With effect from 2021*, all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published in Open Access Journals, on Open Access Platforms, or made immediately available through Open Access Repositories without embargo."

How to Find Open Access Content?

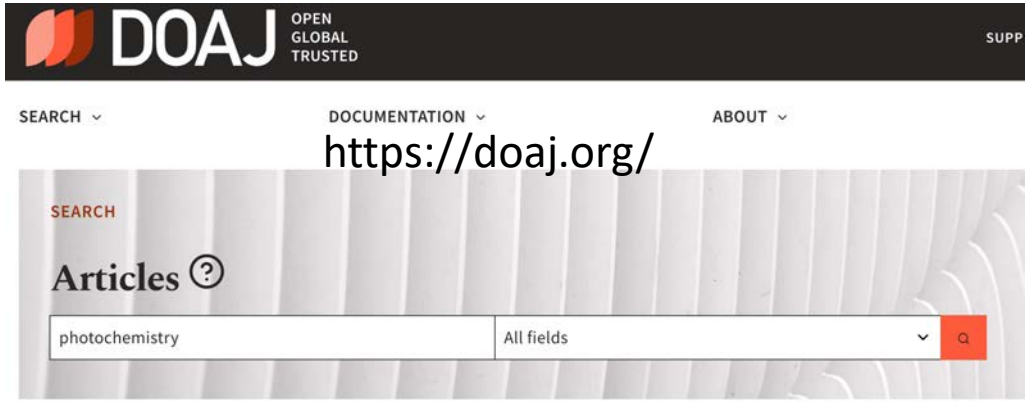


Clarivate

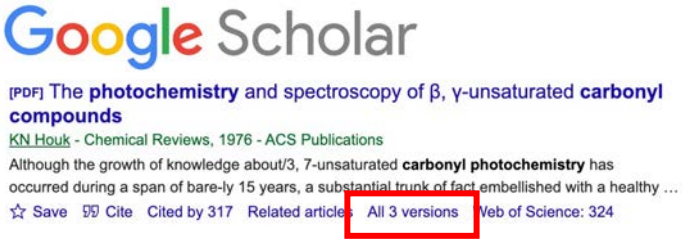
Web of Science™



Directory of Open Access Journals



https://doaj.org/



Publisher websites

Browser extensions

https://unpaywall.org/

Open Access Button

https://openaccessbutton.org/

Next Generation Open Science. Data Repositories for Primary Research Results

Data Servers for Research Data

- ***Precedent already exists: CCDC and PDB for crystallography data***
- ***Chemical publishers are actively working towards setting up repositories for chemical data (NMR, IR, MS, XRD, electron microscopy, etc)***
- ***Near term will be to encourage submission of primary data.***
- ***Long term may require submission of certain types of data.***

CCDC

RCSB PDB PROTEIN DATA BANK

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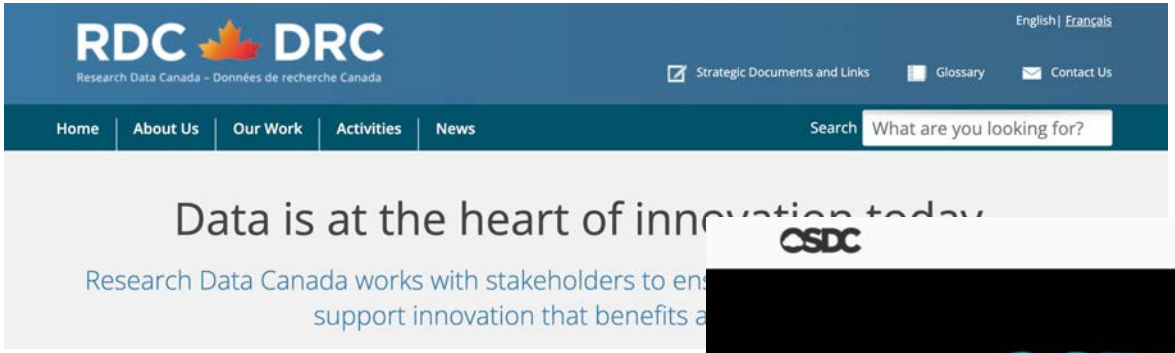
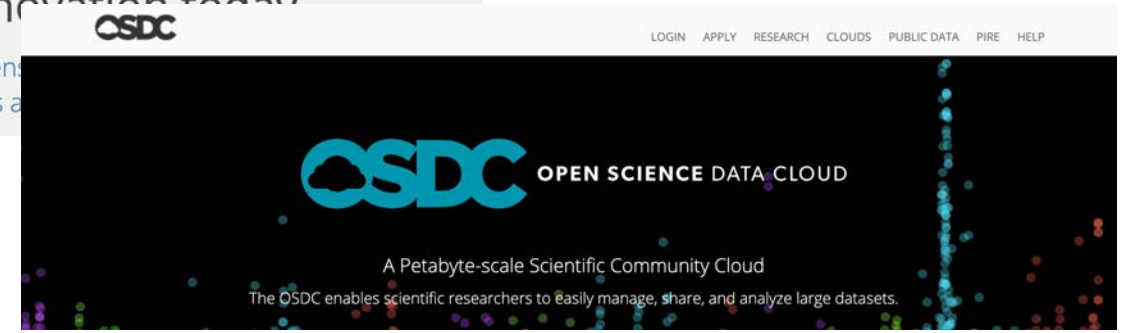
ALSO FOR INSTITUTIONS & PUBLISHERS





What Does the Future Hold for Scientific Publishing? A Window on the Future.

- *Open Access will become broadly accessible to all fields of science and engineering*
- *Many options available may lead to confusion for authors and readers*
- *In the 10 – 15 year timeframe consolidation in the science/engineering publication industry is likely. Not all of the current publishers will survive as the open access movement matures*
- *There may be trends toward fully open science publishing, where peer review is done by the community directly and papers are revised in the open*