
Open Access Publishing in Systems Biology: an Introduction

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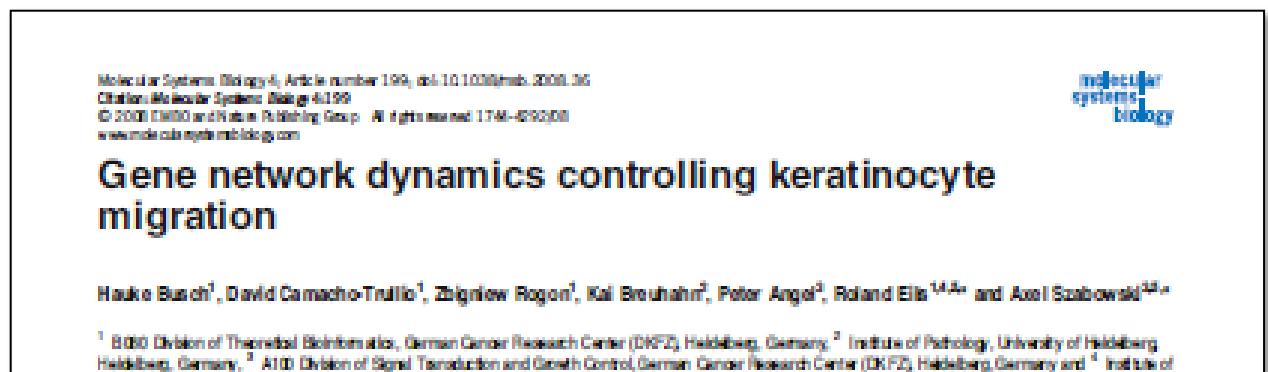
Overview

- Origin of open access
- „Green road“ vs. „golden road“
- Journals and repositories
- Open access to research data
- Research funding and open access
- Peer review, licence models, tools
- Helmholtz Open Access Project

Open Access Paper: Example



Busch, H., D. Camacho-Trullio, Z. Rogon, K. Breuhahn, P. Angel, Roland Eils & Axel Szabowski 2008: Gene network dynamics controlling keratinocyte migration. *Molecular Systems Biology* 4: 199. doi:[10.1038/msb.2008.36](https://doi.org/10.1038/msb.2008.36).



Open Access: Definitions

- Open Access publications:
 - scientific information is made freely available from web repositories (internet servers for digital archiving)
 - it can be read, downloaded, copied, printed, searched, text mined...
 - without financial, legal or technical barriers
- Types of open access information:
 - peer-reviewed scholarly publications
 - other publications (Ph.D. theses, reports, conference papers, posters...)
 - research data

Open Access: Origins

- Rise of the internet:
 - unprecedented possibilities for dissemination of information
 - potential for easier and cheaper access
- Traditional scientific journals:
 - publishing has a cost
 - **but** a considerable price increase („journal crisis“) is ongoing
 - e. g. annual subscription rate for „Biochimica et biophysica acta“: € 19,036*
- Advent of open access movement leads to
 - discussion of new business models in scientific publishing
 - changes in scholarly communication

*Source: *KIT Library*

Open Access: Berlin Declaration

- Berlin Declaration to Open Access to Knowledge in the Sciences and Humanities:
 - milestone of the open access movement
 - signed on 22 October 2003 by the Helmholtz Association and other research organisations
- „In accordance with the spirit of the Declaration of the Budapest Open Access Initiative, the ECHO Charter and the Bethesda Statement on Open Access Publishing, we have drafted the Berlin Declaration to promote the Internet as a functional instrument for a global scientific knowledge base and human reflection and to specify measures which research policy makers, research institutions, funding agencies, libraries, archives and museums need to consider ...”

Open Access: Benefits

- wide dissemination of research results
- increased scientific discussion
- raised public perception of science
- better return on investment by public research funding

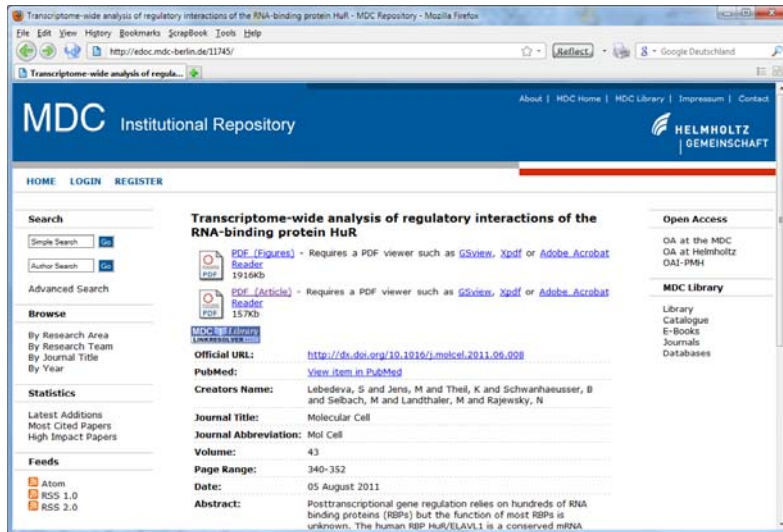
Open Access: „Green“ Road

- Following the „green“ road to open access (self-archiving):
 - researchers (or their libraries) deposit copies of the peer-reviewed articles they publish in a document server („repository“)
 - ask your institutional library for support
 - see listing of publishers‘ copyright policies: SHERPA/RoMEO
 - 80 % of journals allow self-archiving
 - final manuscripts or layouted versions
 - institutional or subject-based repositories
 - open access immediately or after a grace period (i. e. publishers may recoup their investments)



Image: Nicolas Pioch / Ibiblio / CC BY-SA

Repository Contents: Example

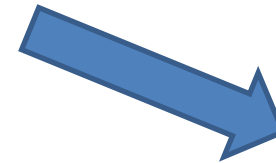
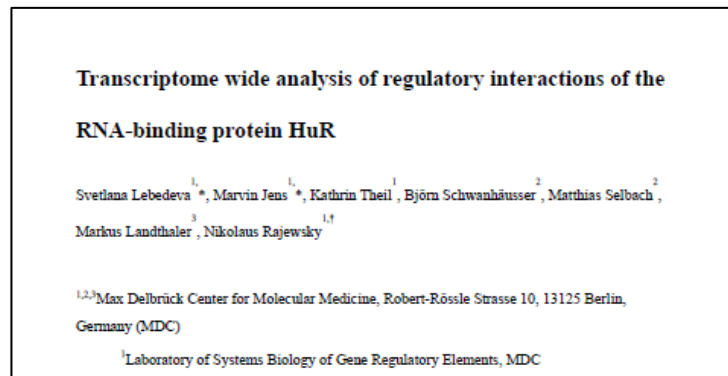


Lebedeva, S. *et al.* 2011:
Transcriptome-wide analysis of
regulatory interactions of the RNA-
binding protein HuR. *Molecular
Cell* **43**: 340-352.
doi:[10.1016/j.molcel.2011.06.008](https://doi.org/10.1016/j.molcel.2011.06.008)



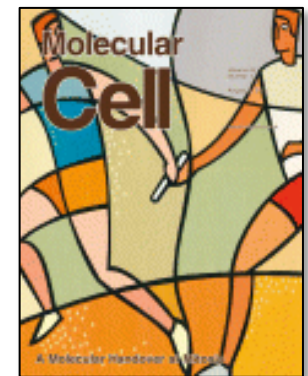
Final draft

Google scholar



Publisher's
version

Google scholar

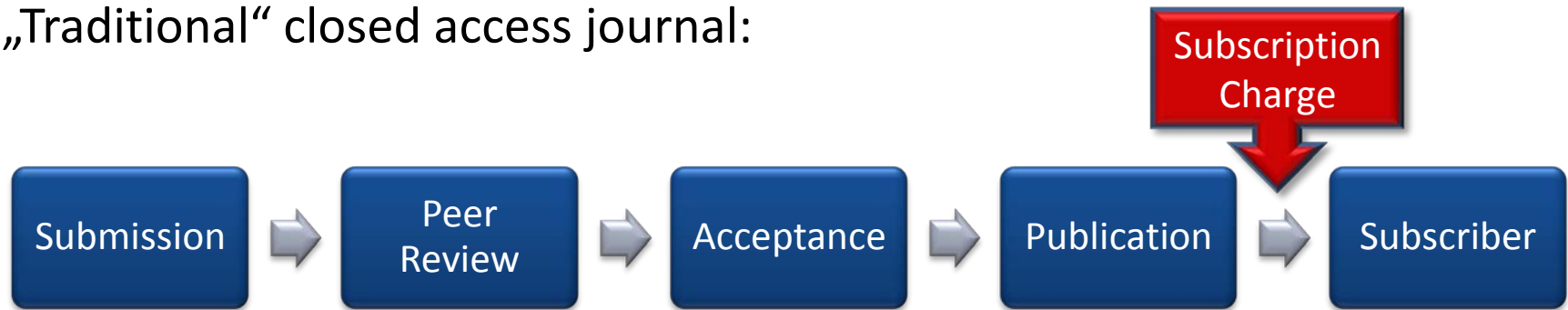


Open Access: „Golden“ Road

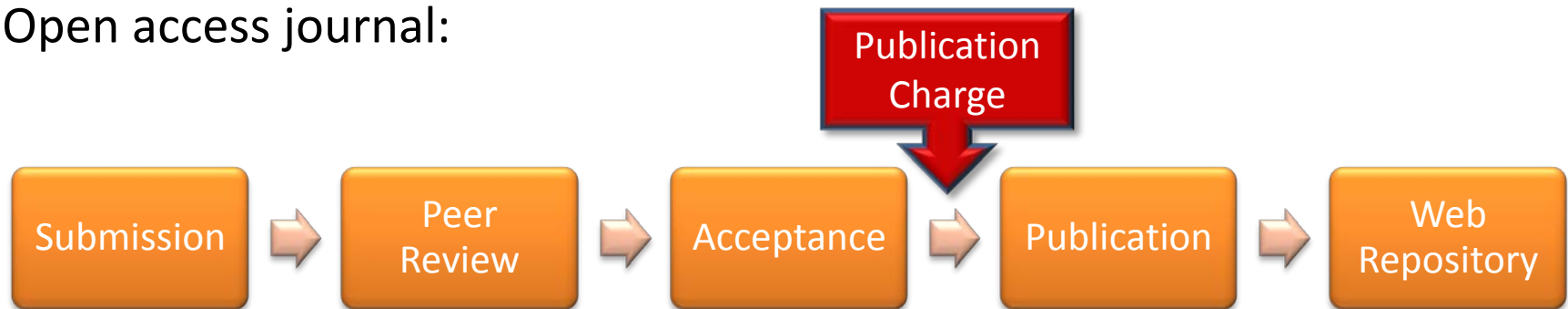
- Following the „golden“ road to open access:
 - researchers publish their articles in „open access“ journals
 - peer-reviewed articles are made available free of charge immediately on publication
 - articles are published under a Creative Commons licence
 - journal usually charges a publication fee
 - journals may have pure open access models or „hybrid“ models (journal operates on traditional subscription-to-read basis, authors have option to pay a fee for immediate open access to their published article, **but**: double payment by library subscription?)

Scientific Journals: Cost Models

„Traditional“ closed access journal:



Open access journal:

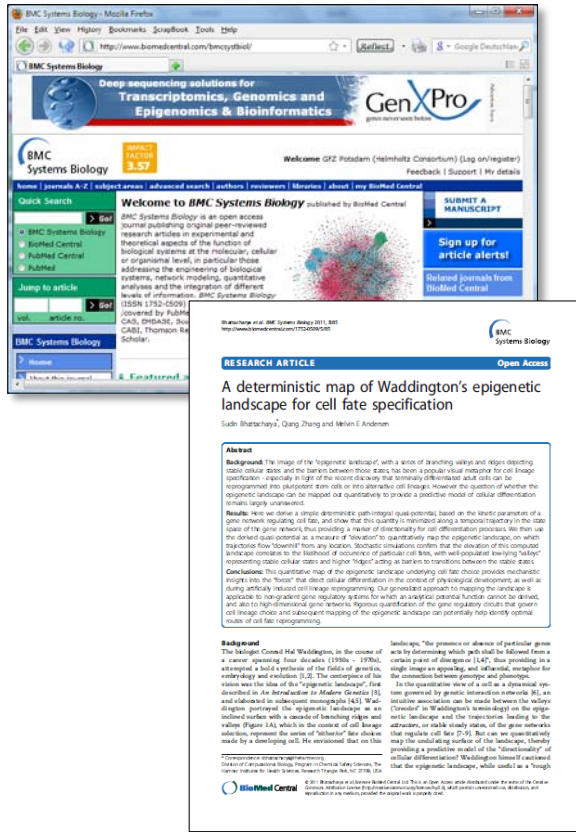


Example: Molecular Systems Biology

- open access journal covering all aspects of systems biology at the molecular level
- financed by article publication charges
- featuring enhanced support for structured data formats and rich links from papers to related databases
- established in 2005
- <http://www.nature.com/msb/>

The image shows a screenshot of the Molecular Systems Biology journal website. The top navigation bar includes 'Journal home', 'Archive', 'Focuses', 'Structured data', 'Online submission', 'For authors', 'Blog', and 'Podcast'. The main content area features a 'Welcome to Molecular Systems Biology' message and a 'Featured article' section. The featured article is titled 'Engineering microbes to sense and eradicate *Pseudomonas aeruginosa*, a human pathogen' by Weiwei Chen¹, Chuan-Kai Wong¹, Ter-Ming Lu, Hong-Sun Nguyen¹, Xia-Ling, Susana De Joo-Liang, Chuan-Lin Post¹ and Matthew Wickham¹. The article abstract discusses the design and construction of a synthetic genetic circuit that senses and kills *Pseudomonas aeruginosa* cells. The introduction section of the article is also visible, discussing the challenges of engineering synthetic biological systems.

Example: BMC Systems Biology



- open access journal publishing original peer-reviewed research articles in experimental and theoretical aspects of the function of biological systems

- financed by article publication charges

- established in 2007

- <http://www.biomedcentral.com/bmcsystbiol/>

Open Access Journals in Systems Biology: Examples

Title	Publisher	Data Deposition	PubMed Central	Article Processing Charge	Licence	IF
Molecular Systems Biology	EMBO / NPG	required	x	€ 2700	CC BY-NC-SA CC BY-NC-CD	9.7
BMC Systems Biology	BioMed Central / Springer	required	x	€ 1345	CC BY	3.6
PLoS One	PLoS	required	x	€ 940	CC BY	4.4
Nature	NPG	required			Publisher	36.1

Open Access Journals: Getting Involved

- many working scientists are active as editors or editorial board members of open access journals
- new open access journals are constantly started
 - new journals are established by publishers
 - existing „traditional“ closed access journals are transformed into open access
 - new journals are founded independently, e. g. by learned societies
- journals use editorial management systems for the entire workflow
 - e. g. open source software: Open Journal Systems

Open Access Journals: Financing

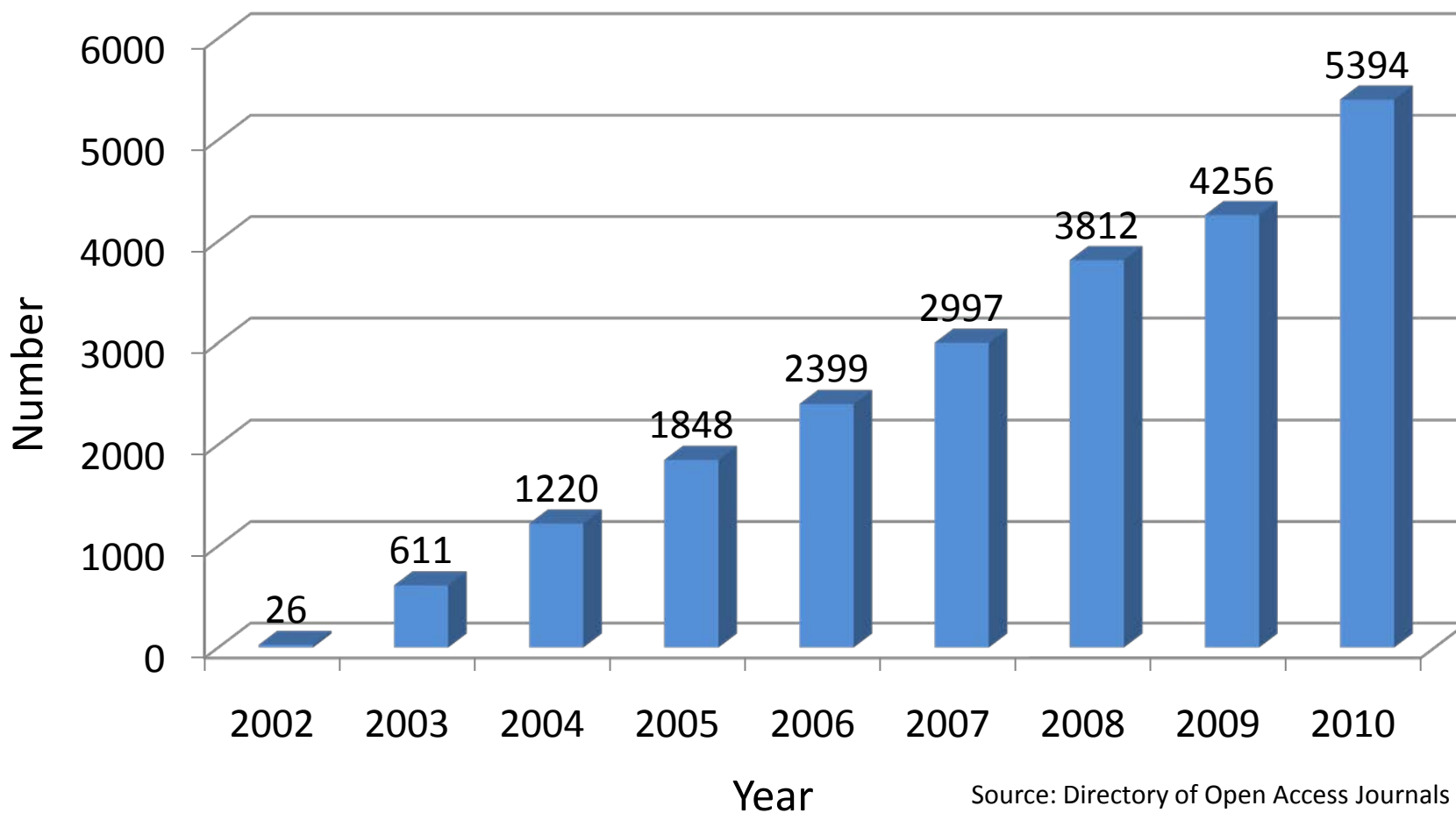
- fee-based
 - financed by article processing charge
- no-fee
 - subsidised by institutions (universities, research centers, learned societies, government agencies...)
 - revenue from advertising, membership dues, print edition...
 - journal run by volunteers

Open Access Journals: Payment of Publication Fees

How was this publication fee covered (multiple answers possible)? [n=9'645]	
My research funding includes money for paying such fees	28 %
I used part of my research funding not specifically intended for paying such fees	31 %
My institution paid the fees	24 %
I paid the costs myself	12 %
Other	5 %

Source: Dallmeier-Tiessen, S. et al. 2011. Highlights from the SOAP project survey. What scientists think about open access publishing. <http://arxiv.org/abs/1101.5260>

Open Access Journals: Growth in Numbers



Repositories

- Institutional repositories:
 - run by a scientific institution or university

- Subject-based repositories:
 - PubMed Central (biosciences)
 - <http://www.ncbi.nlm.nih.gov/pmc/>
 - 2.2 million articles



Pre-print Repositories

- ArXiv

- <http://arxiv.org/>
- founded in August 1991
- 700,000 full texts in physics and mathematics
- Ginsparg, P. 2011: ArXiv at 20. Nature **476**: 145-147. doi:[10.1038/476145a](https://doi.org/10.1038/476145a)

The logo for arXiv.org, featuring the text "arXiv.org" in white on a red rectangular background.

- Nature Precedings

- <http://precedings.nature.com/>
- started in 2007
- manuscripts and presentations in science (except physics and mathematics)

The logo for Nature Precedings, with "nature" in blue and "precedings" in orange. Below it, the text "Pre-publication research and preliminary findings" is written in a smaller, dark blue font.

Open Access: (Re-)Search Engines

- BASE

<http://www.base-search.net/>



- Google Scholar

<http://scholar.google.com/>

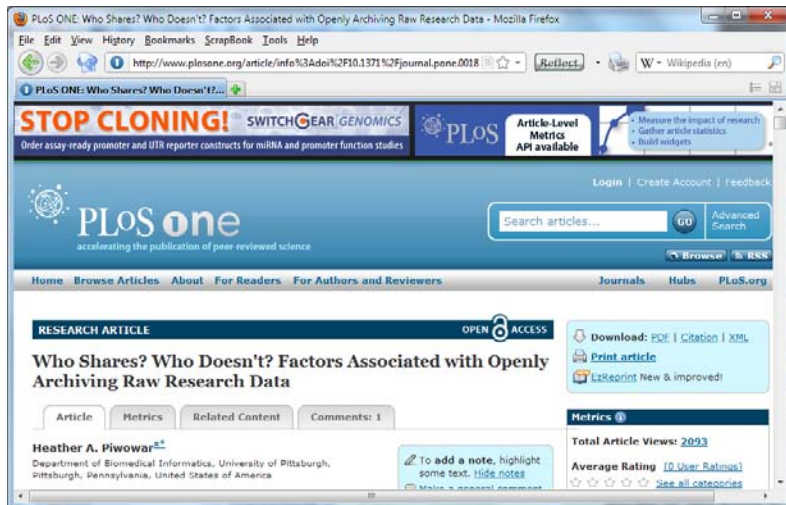


Open Access to Research Data

- data management
 - types of research data
 - work flows
 - costs
- data archiving
 - in the lab
 - in the institution
 - in the project
- data sharing
 - with colleagues
 - with the public
- data repositories
 - DRYAD
 - PANGAEA
- DOI for data
 - DataCite

Linking Publications and Data

Piwowar, H.A. 2011: Who shares? Who doesn't? Factors associated with openly archiving raw research data. PLoS ONE 6: e18657.
[doi:10.1371/journal.pone.0018657](https://doi.org/10.1371/journal.pone.0018657)



Piwowar, H.A. 2011: Data from: Who shares? Who doesn't? Factors associated with openly archiving raw research data. Dryad Digital Repository.
[doi:10.5061/dryad.mf1sd](https://doi.org/10.5061/dryad.mf1sd)



Open Access Policies

- **public funding bodies:**
 - want to derive maximum return from their investment of tax payers' money
 - funding on condition of open access publishing of results (Wellcome Trust, NIH)
- **universities and research associations:**
 - faculty members grant copyright to university and provide copies of their articles (Harvard University, MIT)
 - recommendations for setting up institutional repositories and establishing institutional open access requirements

EU Open Access Pilot: Scope

- focus of open access pilot:
 - peer-reviewed publications in scientific journals resulting from publicly funded research
 - based on self-archiving „green“ open access
- launched in 2008
- covering 20 % of FP7 budget
- applies to 7 areas of FP7
 - Health, Energy, Environment, Information & Communication Technology, Research Infrastructure (6 month embargo)
 - Socio-economic Sciences and Humanities, Science in Society (12 month embargo)

EU Open Access Pilot: Requirements

- deposit of an electronic copy (published version or final manuscript) in an institutional or subject-based repository at moment of publication
- best efforts to ensure that this electronic copy becomes available open access
 - immediately, if the article is published open access or
 - within 6 or 12 months, depending on area

EU Open Access Pilot: Evaluation

- open access pilot (plus open access requirements for all ERC grants) is monitored by the OpenAIRE project - <http://www.openaire.eu/>
- during and after FP7, the EU Commission will analyse the impact of the open access pilot and its benefits to EU-funded research
- the open access pilot will probably be extended to all areas in the next EU Framework Programme
- the follow-up project OpenAIREplus will also include scientific data sets*

*Source: *CORDIS*

Ensuring Peer Review

- peer-review for quality control
 - articles in open access journals should be peer-reviewed as in „traditional“ closed-access journals
- in addition: new possibilities of peer-review
 - two-step process: pre-print plus peer-reviewed article
 - open peer review
 - interaction with users: comments, ratings, download statistics

Licencing: Creative Commons

- Licence

- contract between author and user of resource

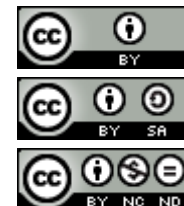
- Creative Commons

- <http://creativecommons.org/>
- non-profit organisation releasing copyright licences for public use



- Examples

- <http://creativecommons.org/licenses/>
- CC BY Attribution
- CC BY-SA Attribution ShareAlike
- CC BY-NC-ND Attribution-NonCommercial-NonDerivs



Licences: Open Access Journals

- licence should allow maximum dissemination and use
 - recommended: CC BY
- more restrictive licences (like CC BY-NC) could prevent use, e. g. in
 - text mining
 - use for course materials
 - in text collections incompatible with less restrictive licences ...
- further information
 - Möller, E. 2007: The case for free use: reasons not to use a Creative Commons - NC license. <http://freedomdefined.org/Licenses/NC>

Web 2.0: Sharing Publications

- Zotero

- free open source reference management system with social network features

The logo for Zotero, featuring the word "zotero" in a lowercase, sans-serif font. The letter "z" is red, while the remaining letters are black.

- Mendeley

- free commercial reference management system with social network features

The logo for Mendeley, consisting of a red icon of three interconnected nodes and the word "MENDELEY" in a red, uppercase, sans-serif font.

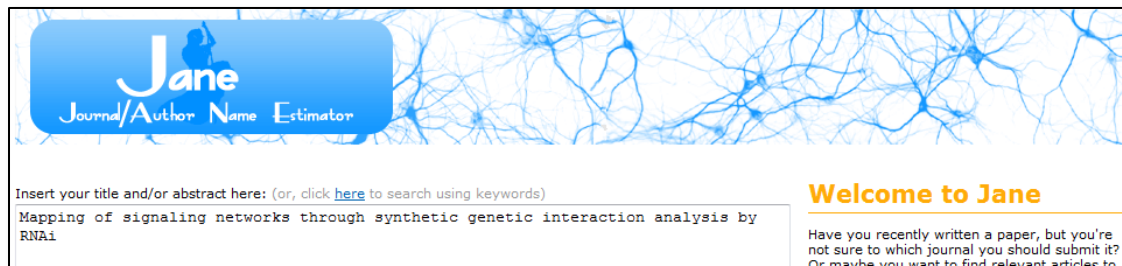
- ResearchGate

- social network for scientists with reference sharing features

The logo for ResearchGate, featuring the word "ResearchGate" in a white, sans-serif font with "Gate" in green, and "SCIENTIFIC NETWORK" in a smaller, white, uppercase font below it, all on a dark grey rectangular background.

Cool Tool: JANE

- bibliographic webtool for bioscientists - <http://biosemantics.org/jane/>
 - enter title / abstract of your manuscript



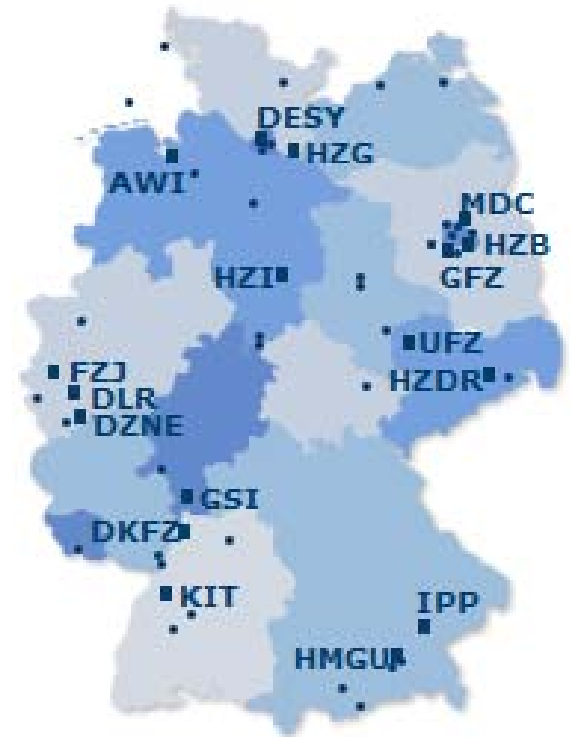
- JANE uses biosemantic search in Medline (database of PubMed) to return list of best matching journals, including their open access status

The screenshot shows the results page of the JANE webtool. It displays a list of journals recommended based on the input. The table below summarizes the data shown in the screenshot.

Confidence	Journal	Article Influence	Articles
	Nature methods	8.71197	Show articles
	Science (New York, N.Y.)	16.5797	Show articles
	Proceedings of the National Academy of Sciences of the United States of America PubMed Central: immediately	4.85992	Show articles
	PloS one Open access PubMed Central: after 0 months	1.92142	Show articles
	Journal of biology Open access PubMed Central: after 0 months		Show articles

Helmholtz Association

- Germany's largest scientific research organisation
- 31,000 employees in 17 research centres
- cutting-edge research to „solve the grand challenges of science, society and industry“
- six research fields:
 - Energy
 - Earth and Environment
 - Health
 - Key Technologies
 - Structure of Matter
 - Aeronautics, Space and Transport



Helmholtz Open Access Project

- for Helmholtz Centres and scientists: support with information and advice on open access
- for the majority of Helmholtz Centres who operate institutional repositories for text publications: advice on technical, practical and legal questions
- for scientists active as editors: support on founding of new open access journal and migration of existing journals to open access
- for scientists and managers of data centres: information on open access to research data



Open Access: Further Reading

- Berlin Declaration to Open Access
<http://oa.mpg.de/openaccess-berlin/berlindeclaration.html>
- Listing of publishers' copyright policies
<http://www.sherpa.ac.uk/romeo/>
- Creative Commons attribution license
<http://creativecommons.org/licenses/by/3.0/>
- The power of open. Creative Commons Corporation , 2011.
<http://thepowerofopen.org/>
- Directory of Open Access Journals (DOAJ)
<http://www.doaj.org/>
- Getting your feet wet: an introduction to open access
http://www.rin.ac.uk/system/files/attachments/open_access_booklet_screen_0.pdf
- Information platform open-access.net
http://open-access.net/de_en/

Helmholtz Open Access Project

Thank you for listening!

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