Open Access - or Open Science?

Community: Barriers & Priorities
Community journals
Quality assurance, selectivity & optimized publishing process
Open Science
Publishing at EMBO

Community responsive
Not-for-profit
Support scientific excellence
Selectivity (quality + interest, not fashion)
Open Science (Open Access = building block)
Barriers to Adopting Open Science

• Lack of resources and infrastructure
• Cost: Time + Money
• Competitive advantage
• Concern about extra scrutiny
• Lack of policies & incentives
• Priority is high impact research paper
• Journals?

‘Why should I go the extra mile if others don’t?’
‘It is hard enough to publish a paper as it is!’
Looking back at the papers you have published in the past 5 years, how important was it for you to choose Open Access?

- Very important
- Important
- Somewhat important
- Not so important
- Unimportant

\[
\begin{array}{c}
\text{Very important} & \text{Important} & \text{Somewhat important} & \text{Not so important} & \text{Unimportant} \\
30 & 55 & 35 & 15 & 15 \\
\end{array}
\]

\[n=162\]

Importance of Open Access to researchers

‘OA, but not at all costs’
Barriers to Adopting Open Science

Lack of resources and infrastructure:

- data management (e-notebooks, data archiving)
- Data curation expertise
- Connection to Journals/Preprints/Databases

Journals:  
- OA  ✔️
- OS  ✖️
Barriers to Adopting Open Science

Lack of resources and infrastructure:

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Journals: OA

OS ➔ Transparent, Transferable Review
 ➔ Source Data + Technical Review + Curation
 ➔ Data & Preprint Citation
 ➔ Structured Methods
The Journal problem in a

Disseminate
Archive
Quality Control
Select

Academic currency
‘publish or perish’

Journal Impact Factor and name should not be misused as proxies in research assessment

DORA is not critical of Journal selectivity
Peer reviewed journals are filters for

Quality & Reproducibility

Interest & Novelty

>28k STM journals
>3 million papers/year

EMBOpress
Journal Selectivity – a barrier?

- Quality control
- Navigate literature (+ Open Science)
- Enrich for excellence/value (cf. funders, institutions)

3 million papers

Excellence

Value

Quality

10-15%
## Inefficiency & Friction

- Research assessment outsourced to <5% journals
- Endless revision & serial submission

- Only a fraction of reliable data is published/shared

- Some published data is unreliable
  - Limited reproducibility
  - Research integrity
Research Integrity, Reproducibility
& Efficient Research Process

What can Journals do?

• Optimized editorial process
• Prepublication checks
• Enhanced papers
• Open Science
Enhancing the utility of Journals of Papers

- Transparent, fair selection process
- Open, transferable peer review

Paper of the future:
  - from cellulose to digital
  - from narrative driven to data-focussed

- Complement Journals with Open Science platforms
Data Centric Papers
Reproducibility, Discoverability

Source Data

AI based semantic analysis & data directed search
Integration with data repositories

Paper

Molecular Systems Biology

SmartFigure

Database

EMBL-EBI

BioStudies

Integration with data repositories
Open Science

- Reliability
- Value
- Curation
- Peer Review

Structured Databases

- >25k STM journals
- >2.5 million papers/year

bioRxiv

Unstructured Data

- DRYAD
- Figshare
- Zenodo

SOURCE DATA

- EMBD-EBI
- EMDataBank
- PRIDE
- GEO
- EMBL Nucleotide Sequence Database
- ncbi GenBank
- DDBJ DNA Data Bank of Japan
- BioModels
- Bioarchive
- RCSB PDB Protein Data Bank
- ARRAY EXPRESS
- Proteome Xchange
- DbGaP Genotypes and Phenotypes
- GEIMOM

SysMO DE Systems Biology of Microorganisms
Reproducible Methods

Reagents & Tools Table (materials, instruments, software: source & identifiers)

Protocols (text & video)
Research outputs

Experiment – shared in group
Data – shared in trusted network
Structured Data/Metadata – open
Preprints – open
Research papers
Reviews/Commentary

Institutions
Publishers

Standards
Curation
Quality control
Selectivity
Quality Open Science: how to make it work?
Quality Open Science: how to make it work?
Quality Open Science: how to make it work?

Distributed responsibilities:
- Journals
- Institutions
Quality Open Science: how to make it work?

Distributed responsibilities:
- Journals
- Institutions
- Individual researchers
"It was a shock to receive your E-mail but the accompanying "Text comparison report" undoubtedly showed that the plagiarism was happened... I wrote this article in Chinese and sought help from Guangzhou Translation. Because of the misbehavior of 广州译文, I innocently became guilty of plagiarism."
‘It was a shock to receive your E-mail but the accompanying "Text comparison report" undoubtedly showed that the plagiarism was happened... I wrote this article in Chinese and sought help from Guangzhou Translation. Because of the misbehavior of 广州译文, I innocently became guilty of plagiarism.’
Quality control saves research $ and careers

Duke University to Pay $112.5 Million to Settle Claims of Research Mis... The university submitted falsified data in connection with 30 grants obtained from the N.I.H. and E.P.A., according to a whistle-blower lawsuit.

nytimes.com
Limit redundancy in quality control

manuscript

preprint

editorial assessment

peer review

quality control & curation

~x10

copyediting

publication
Pre-Journal review

one set of referees to publication
A key barrier: Publishing cost

Main cost: selectivity editorial process

Transfers enhance efficiency
### Perceived Cost of Journal Services

#### BASICS
- **Transparent & fair peer review, detailed decisions:**
  - €1k: 52%  
  - €2k: 18%  
  - €4k: 18%  
  - €8k: 3%  
  - ?: 8%
- **Approachable and responsive editors:**
  - €1k: 38%  
  - €2k: 28%  
  - €4k: 22%  
  - €8k: 4%  
  - ?: 8%
- **Rapid review & decisions:**
  - €1k: 34%  
  - €2k: 31%  
  - €4k: 24%  
  - €8k: 3%  
  - ?: 8%
- **Rigorous editorial process:**
  - €1k: 39%  
  - €2k: 28%  
  - €4k: 22%  
  - €8k: 4%  
  - ?: 8%

#### SPECIAL SERVICES
- **Professional checking of data presentation, image integrity, text duplication, statistics, etc.:**
  - €1k: 10%  
  - €2k: 27%  
  - €4k: 28%  
  - €8k: 11%  
  - ?: 14%
- **Data deposition & curation:**
  - €1k: 11%  
  - €2k: 22%  
  - €4k: 27%  
  - €8k: 15%  
  - ?: 15%
- **Highlighting of articles:**
  - €1k: 7%  
  - €2k: 17%  
  - €4k: 30%  
  - €8k: 21%  
  - ?: 16%

#### PREMIUM
- **Language editing:**
  - €1k: 3%  
  - €2k: 16%  
  - €4k: 36%  
  - €8k: 28%  
  - ?: 17%

### Community investment: 8h per person per week
Different Priorities

‘main concern for universities and negotiating consortia is cost control’

Editorial reject: ~150 Euro/ 4days
Peer Review reject: ~1000 euro/ 30days
No ‘one size fits all’ competitive funding for journals

- Journals apply to a competitive PlanS funding scheme
- Journals supported according to transparent attributes:
  - Quality
  - Open Science
  - Subject specific
EDITORIAL ACTIVITIES COST
time=money

<table>
<thead>
<tr>
<th>Activity</th>
<th>n</th>
<th>Σ h/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>editor in chief</td>
<td>10</td>
<td>76</td>
</tr>
<tr>
<td>editorial function</td>
<td>83</td>
<td>322</td>
</tr>
<tr>
<td>advisor/board</td>
<td>106</td>
<td>274</td>
</tr>
<tr>
<td>peer review</td>
<td>157</td>
<td>618</td>
</tr>
<tr>
<td>other</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>357</td>
<td>1316</td>
</tr>
</tbody>
</table>

8h per person per week
The Goal:  
a more efficient & effective research process

**OA, OS, Quality, Efficiency**  
*emphasis depends on stakeholder*

- Access for readers and authors
- Less (shared) unreliable research
- Less publishing for sake of research assessment alone
- Digital media: Open Science to complement OA
- Cost secondary concern

*Share data – as papers only where it adds value*
EMBOpress

Submit in any format

Easy submission

95% of revisions published

Fast publication

3 days
First decision

3 months
Revise & publish

30 days
Peer-review

Clear decisions
Focus on essential experiments – only one round of revision

EMBO reports
THE EMBO JOURNAL
molecular systems biology
EMBO Molecular Medicine

embopress.org

author-editor compact
Publish peer reviews

Jessica K. Polka and colleagues call on journals to sign a pledge to make reviewers’ anonymous comments part of the official scientific record.

We, the undersigned journals, recognise the benefits of transparency in the peer review process. Therefore, we enable the publication of all of the content of peer review (not necessarily the names of reviewers) and the author responses alongside final, published articles…..

Posting referee reports on papers & preprints*

- 3 orthogonal expert views on dataset
- Training
- Referee Credit
- Accountability

*both for preprint version of published papers AND rejected papers

‘We, the undersigned journals, recognise the benefits of transparency in the peer review process. Therefore, we enable the publication of all of the content of peer review (not necessarily the names of reviewers) and the author responses alongside final, published articles…..’
• Referee Cross-Commenting
• Author Preconsultation

• Scooping protection
• Unlimited & open references (i4OS)
• Preprint & Data citation
• Portable Manuscripts/Peer review (MECA)

Preprint ↔ Journal ↔ Journal
## OA at EMBO

<table>
<thead>
<tr>
<th>Year</th>
<th>Type</th>
<th>OA Percentage</th>
<th>Self/Free Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Hybrid</td>
<td>~28%</td>
<td>6mo self, 12mo free</td>
</tr>
<tr>
<td>2000</td>
<td>Hybrid</td>
<td>~28%</td>
<td>6mo self, 12mo free</td>
</tr>
<tr>
<td>2005</td>
<td>OA</td>
<td></td>
<td>APC, DEAL</td>
</tr>
<tr>
<td>2008</td>
<td>Hybrid</td>
<td></td>
<td>APC, DEAL</td>
</tr>
<tr>
<td>2018</td>
<td>OA</td>
<td></td>
<td>APC</td>
</tr>
</tbody>
</table>

**Logos**

- **EMBO Journal**
- **EMBO Reports**
- **molecular systems biology**
- **EMBO Molecular Medicine**
- **Life Science Alliance**

**Logos**

- **CSHL Press**
- **Rockefeller University Press**
2-5y priorities: equitable open access, selectivity & open science

- Don’t replace one barrier (readers) with another (authors)
- Support quality and selectivity
- OA models should not block OS developments
- Global solution
- Include reviews, commentary and journalism

- Consult with all stakeholders (scientific community)
- Maximize OA papers over OA Journals
- Sustainable P&R solution (DEAL asymmetrical, local)
- Retain diversity: Protect independence/viability of small community journals/institutions
Priorities: OA, OS, Quality, Efficiency

PlanS

- Copyright with authors
- CC-BY
- COPE level process
- DORA
- Cost transparency by publishers
- No Hybrid
- APC charge caps?
- Transitional Agreements (NB: OA flip binary decision)
Consistent, sustainable solution to protect quality and selectivity

- No ‘one size fits all’: geography, field, platform
- Differential costs for Open Science & Quality attributes

NB:
- Financial model to include both *published* and *submitted* research papers
- Include all valuable publication outputs
- Gaming for volume, eligible paper formats and authors
- Consider publication costs as % of research costs
  (~2-3% in biosciences)
## Solution 1

differential charges for services

<table>
<thead>
<tr>
<th>Publishing Option</th>
<th>Preprint</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>XL</th>
</tr>
</thead>
<tbody>
<tr>
<td>APC</td>
<td>0.1x</td>
<td>1x</td>
<td>2x</td>
<td>3x</td>
<td>4x</td>
</tr>
</tbody>
</table>

- **Published as author-provided PDF**
- **DOI assignment**
- **Commenting facility**
- **Peer-review**
- **PubMed indexing**
- **Indexing in Web of Science**
- **Promotion on social media**
- **Typesetting**
- **Published as full text HTML/PDF**
- **Search engine optimized**
- **Data curation and deposition**
- **Copy editing and language editing**
- **News & View highlights**
- **Cover image**
- **Help with graphics design**

What is the additional feature would you like to add for an 400 Euro upgrade (excluding peer review)?
Data Transparency

Insulin, we hypothesized that insulin sensitivity could be reflected not only by changes in glucose but also by the OGTT response of multiple other metabolites. Because our initial studies were focused on normal, healthy individuals spanning a narrow range of fasting insulin levels, we performed a second analysis on a group of individuals with impaired glucose tolerance from the Framingham offspring study (POG57), who spanned a broader range of fasting insulin concentrations (Table 1).

First, to systematically evaluate the relationship between individual metabolic excursions and fasting insulin, we performed linear regression of the fasting insulin concentration on each of the 18 2h excursions. Out of the 18, 6 showed a statistically significant ($p<0.05$) correlation with fasting insulin, and included the excursions in lactate, 3-hydroxybutyrate, amino acids (leucine/isoleucine, valine, and methionine), and a bile acid (GCDCA) (Table 1). Taken together with the glycerol excursion, which scored ($p=0.027$) slightly below the significance threshold, the response of four distinct insulin action markers correlated with fasting insulin (Figure 5A). Individuals with high fasting insulin exhibited a blunted excursion in all seven metabolites; they had a smaller change both in increasing metabolites (lactate and GCDCA) and in decreasing metabolites (the other three). Notably, the glycerol excursion was not correlated with fasting insulin ($p=0.29$). These findings suggest that resistance to the action of insulin...
Differential charges matrix
Baseline: Gold OA/minimal standards* compliant charge cap + charge supplement:

Field (% research investment in paper)

Medical  Sciences  Biosciences  Chemistry  Physics  Humanities.....

- Transparent review system
- Community publishing services
- Acceptance rate
- Data sharing
- Data Curation
- Structured methods
- Preprint deposition
- Research Integrity screening/COPE
- DORA compliant
- Editorial & design services
- Dissemination/Contextualization

* OASPA, DOAJ; PM/P PMC; Author contribution; Crossref, ORCID, i4OS, Cloccks, Shibboleh...
Aims: OA, OS, Quality, Efficiency

PlanS

✓ Copyright with authors
✓ CC-BY
✓ COPE level process (integrity)
✓ DORA (research assessment)
✓ Cost transparency

No Hybrid

Transitional Agreements? (NB: OA flip binary decision)

APC charge caps?

PlanS vs. Publish&Read Deal

APCs: cost transparency conflated with research budgets
published authors bear all costs
don’t work for reviews/commentary/journalism
Issues

Consult with all stakeholders (community)*
Don’t replace one barrier (readers) with another (authors)
Don’t undermine quality, selectivity and Open Science
Consider reviews, commentary and journalism
Protect independence/viability of small community journals/institutions: retain diversity
Focus on OA Journals, not maximizing OA papers
DEAL negotiations asymmetrical, local:
   demonstrate a global, sustainable solution

*EMBO community consultation was reported to cOAlitionS
Solutions

*consistent & sustainable solution to protect quality and selectivity*

- No ‘one size fits all’: geography, field, platform
- Differential costs for Open Science & Quality attributes
- Consider publication costs as % of research costs*
- Financial model to include BOTH published and submitted research papers*

* 2-3% in biomed sciences*
Solutions: take into account selectivity & avoid gaming

Acceptance rate = Submitted / published
Diammond OA and PlanS: how to distribute funding

Journals apply individually to a central PlanS funding scheme, that select journals according to transparent quality attributes (may assign charge caps according charge matrix)
 IDENTIFYING PAPERS WORTH READING

- Novelty & general interest
- Authors you know/recognise
- Scientific soundness
- Preprint repository
- Conference abstract

n=162
Additional slides
Top down or bottom up?
Support models that advance Open Science through quality & selectivity
Reproducible & Discoverable Data

Pre-preprints or trusted network

[Data citation standard]
Preprints – dissemination before review

bioRxiv

~32,500 preprints (~90% approved; 95% ‘new’; 28% revised)
~187,000 authors; 11,700 institutions; 108 countries
>60% of papers subsequently published in >400 journals (incl. Nature, Science, EMBOJ, JCB)
USE OF JOURNAL INCOME

By what percentage do you feel a society should be allowed to increase the APC above the actual cost of publishing, to allow them to fund their other activities?

Society income: ~28%
Why does OA cost (so much) 
Journal $ are for a service

the service is to:
• select reliable and interesting research worth sharing
• to improve the research
• to improve the way the research is presented
What is a figure?

A clinical experiment (945 patients) converted into pixels...
Reanalysis of data

Figure 4. Survival Distributions Observed in Human Clinical Trials of Combination Therapies Are Similar to Those Expected for Independent Drug Action Given the Observed Variability in Response to Monotherapy

Survival functions for clinical trial data were extracted from published Kaplan-Meier survival curves by image processing (the data are not available in digital form). Survival data published in vector form was processed in Adobe Illustrator to remove censor marks and dashing, and to separate trial arms to individual images. Survival data that were published only in a pixelated form were digitally traced in Adobe Photoshop. After producing separate image files for each treatment condition, a high-resolution raster (at minimum 2000 pixels high) was processed by a custom script in Wolfram Mathematica which measured the number of pixels in each row between the time = 0 mark on the horizontal axis and the survival function. The number of pixels per row was calibrated against tick marks on the time axis to convert to the duration of progression-free survival. It would obviously be preferable to start with the original numerical data, but we are aware of no repository of such information.
Prepublication quality control
Image Aberrations

Mistakes
Beautification

Fabrication
Fraud

17%

0.5%*

(*detection by routine screening; ~40'/manuscript)
Scientific communication

‘If I have seen further it is by standing on the shoulders of giants’
Isaac Newton, 1675
"Darwin’s theory is scientifically wrong...needs to change in the school and college curriculum. Nobody...ever saw an ape turning into a human" S. Singh, minister for higher education
Extraordinary claims require extraordinary evidence


‘we did not prove an association between the MMR vaccine and the syndrome described. Virological studies are underway that may help to resolve this issue’

retracted 2010

- scientifically flawed
- fraudulent
- unethical

Measles 2018: a tale of two anniversaries
Sansonetti P. EMBO Mol Med (2018) e9176
Journals vs. Alt-Facts

Trump offers vindication to vaccine skeptic doctor
The US president is embracing Andrew Wakefield’s debunked claim linking a top vaccine to autism.

By CARMEN PAUN | 2/9/17, 5:04 PM CET | Updated 2/20/17, 4:53 PM CET

WHO warns over measles immunisation rates as cases rise 400% across Europe
2017 saw more than 21,000 cases and 35 deaths, with large outbreaks in one in four countries, says World Health Organisation

Germany: Measles vaccine could be compulsory for kids
With the threat of a measles outbreak hanging over Germany, the government is considering making the vaccination mandatory for children. While many parties back the
Trump offers vindication to vaccine skeptic doctor

The US president is embracing Andrew Wakefield’s debunked claim linking a top vaccine to autism.

By CARMEN PAUN | 2/9/17, 5:04 PM CET | Updated 2/20/17, 4:53 PM CET

Arizona lawmaker calls mandatory measles vaccine 'communist' amid fight to control outbreaks

“The idea that we force someone to give up their liberty for the sake of the collective is not based on American values,” the state representative wrote on Facebook.

Vaccine Law Barring 300 Children From Kindergarten

WHO warns over measles immunisation rates as cases rise 400% across Europe

2017 saw more than 21,000 cases and 35 deaths, with large outbreaks in one in four countries, says World Health Organisation

Sarah Boseley | Health editor

Germany: Measles vaccine could be compulsory for kids
Scientific communication

Editors

Quality Control

Curation

Peer Review

Discovery!

![Checkmark](EMBOpress)