

# Open Access - or Open Science?

Community: Barriers & Priorities

Community journals

Quality assurance, selectivity & optimized publishing process

Open Science



EMBOpress

Bernd Pulverer  
Chief Editor | *The EMBO Journal*  
Head | Scientific Publications

THE  
EMBO  
JOURNAL

EMBO  
*reports*

EMBO  
Molecular  
Medicine

molecular  
systems  
biology

  
Life Science Alliance

# Publishing at EMBO

**Community responsive**

**Not-for-profit**

**Support scientific excellence**

**Selectivity** (quality + interest, not fashion)

**Open Science** (Open Access = building block)

THE  
EMBO  
JOURNAL

EMBO  
*reports*

EMBO  
Molecular  
Medicine

molecular  
systems  
biology



Life Science Alliance

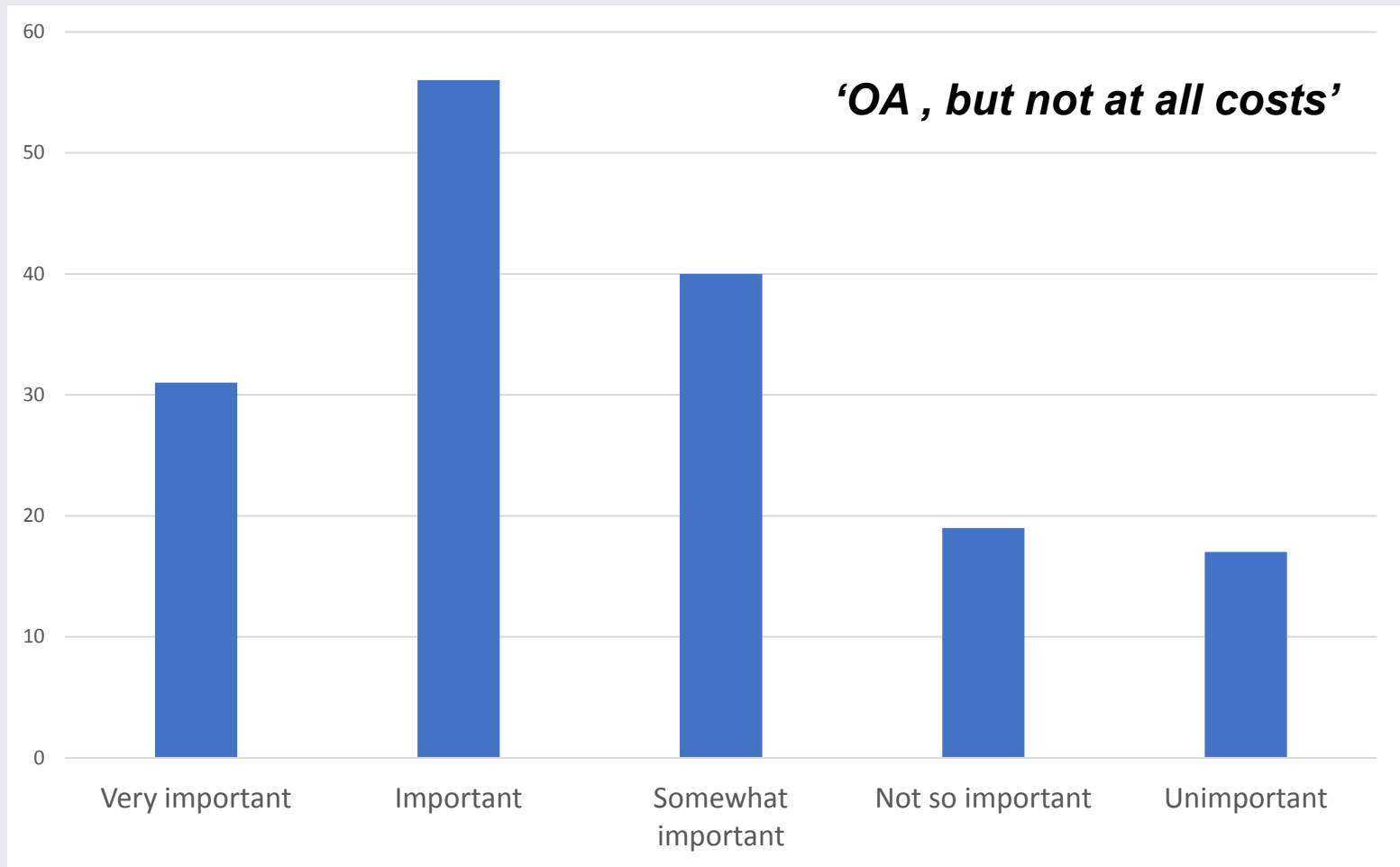
# Barriers to Adopting Open Science

- 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!’*

# Importance of Open Access to researchers



**n=162**

# 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**

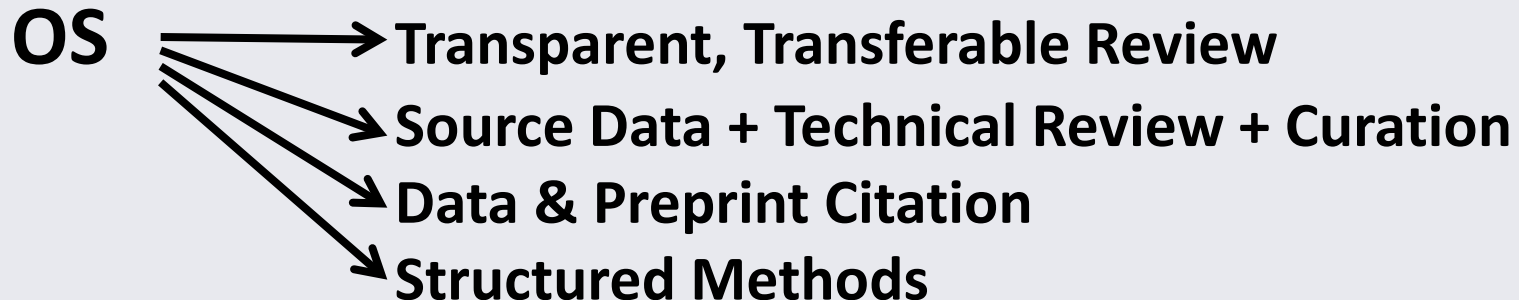


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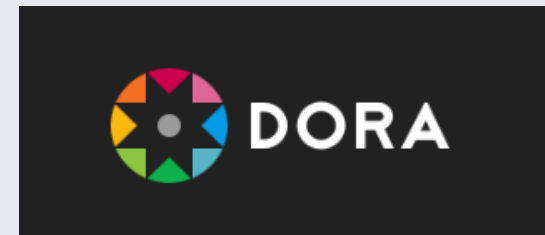
# The Journal problem in a



Disseminate  
Archive  
Quality Control  
Select

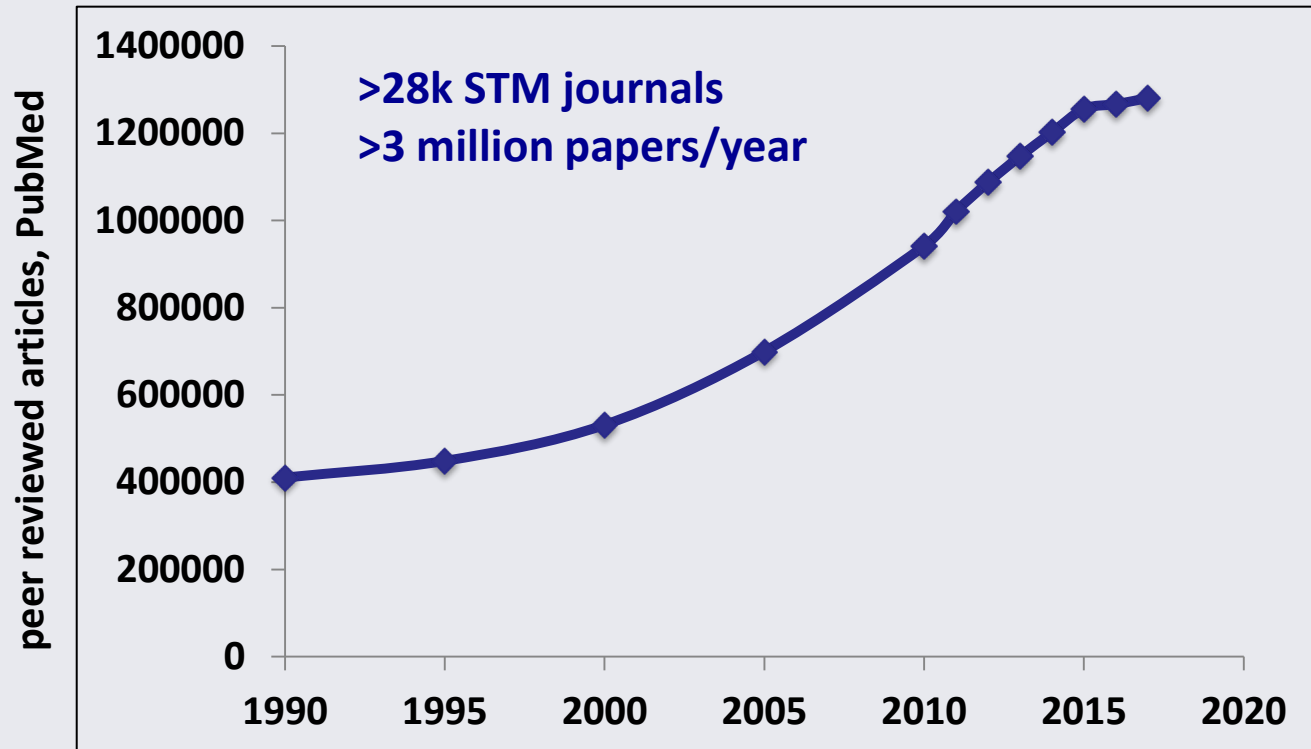


Academic currency  
'publish or perish'



Journal Impact Factor and name should not be  
misused as proxies in research assessment  
*DORA is not critical of Journal selectivity*

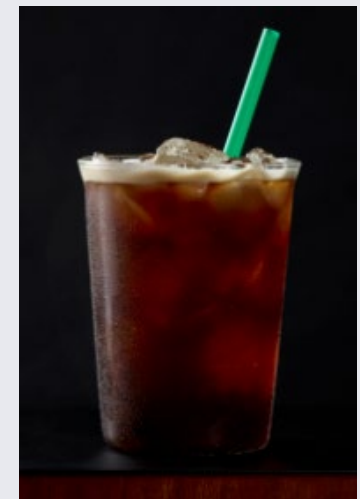
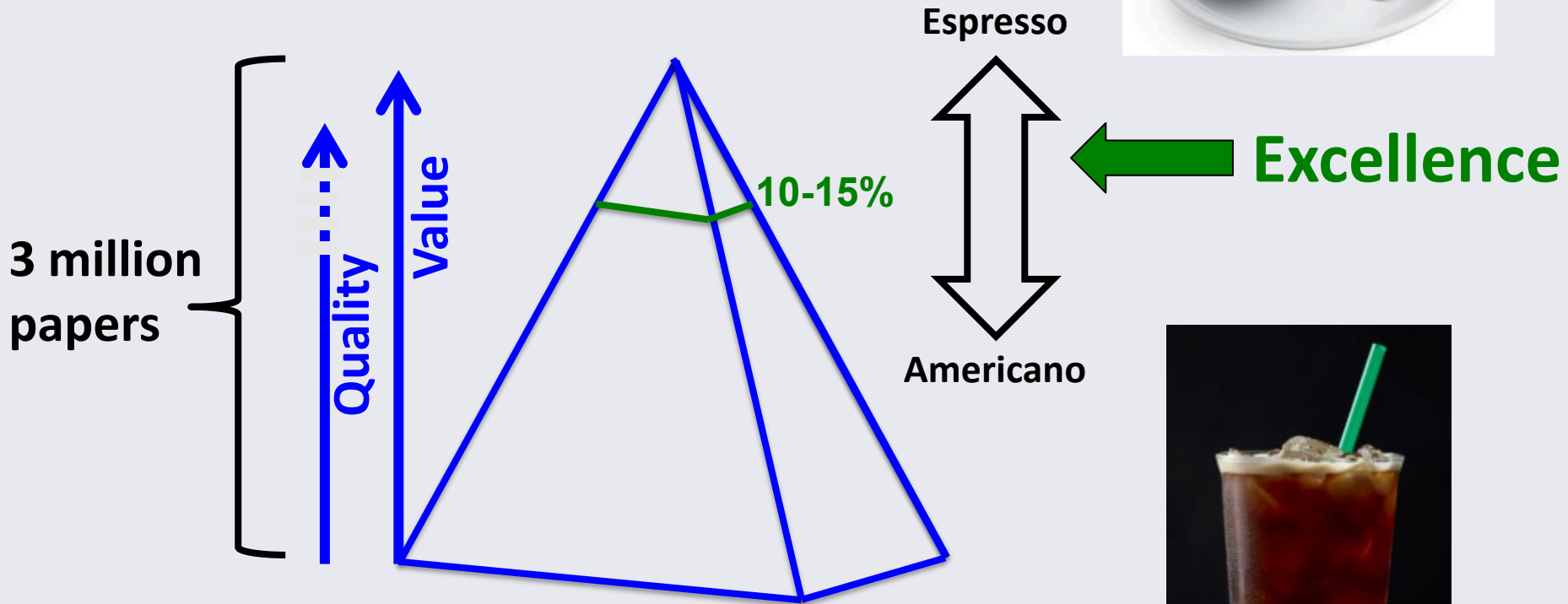
# Peer reviewed journals are filters for Quality & Reproducibility Interest & Novelty





# Journal Selectivity – a barrier?

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



The  
Economist

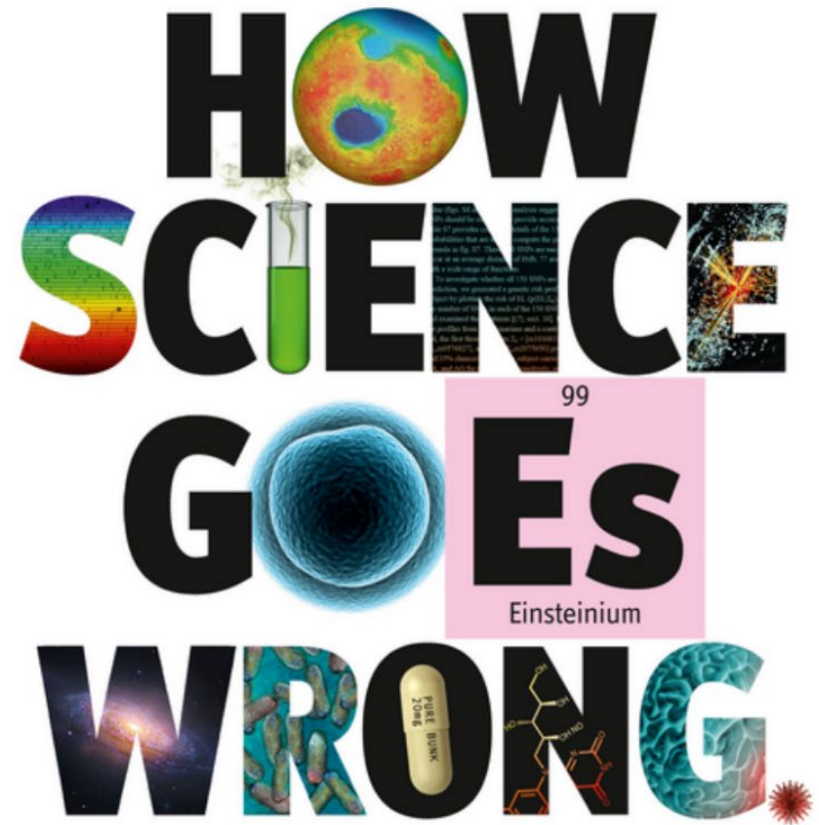
OCTOBER 19TH-25TH 2013

Economist.com

Washington's lawyer surplus  
How to do a nuclear deal with Iran  
Investment tips from Nobel economists  
Junk bonds are back  
The meaning of Sachin Tendulkar

HOW  
SCIENCE  
GOES  
WRONG

99  
Einsteinium



Reproducibility



Scientific  
Integrity



'publish or  
perish'



# 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

Reproducibility



Scientific Integrity



'Broken Peer Review'



\$\$\$



Medical research

# The shackles of scientific journals

And how to cast them off



Getty Images

Print edition | Leaders >

Mar 25th 2017



ScienceGuide

## Open Access negotiators prepare for a future without publishers

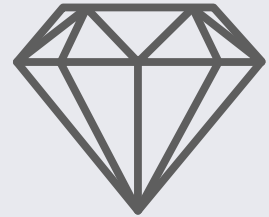
door Sicco de Knecht

4 mei 2018 | Berlin last Wednesday was the stage for a first ever international meeting of academic open access negotiators. At the invitation of Horst Hippler, chair of the German

# Research Integrity, Reproducibility & Efficient Research Process

## What can Journals do?

- Optimized editorial process
- Prepublication checks
- Enhanced papers
- Open Science



TRANSPARENT  
PROCESS

# 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
- }] Open Science
- **Complement** Journals with Open Science platforms

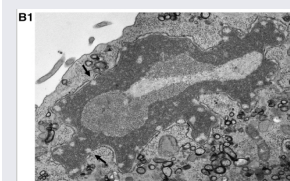
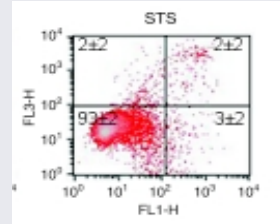
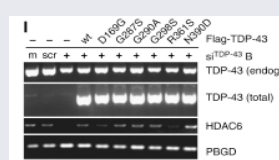
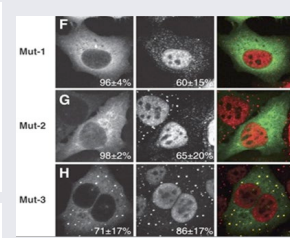
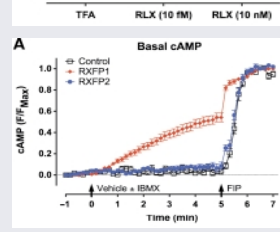
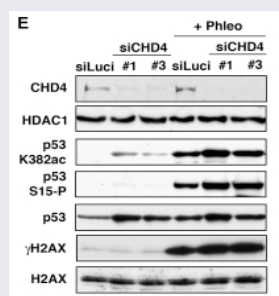
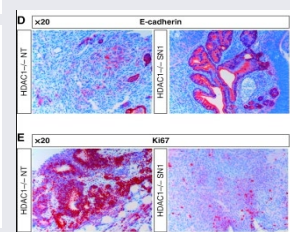
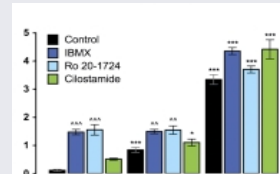
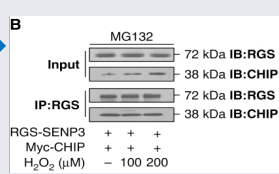
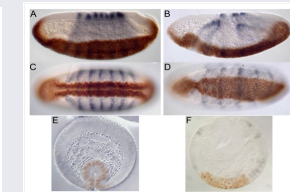
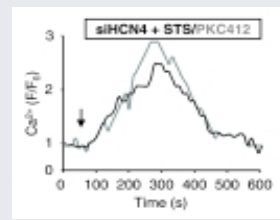
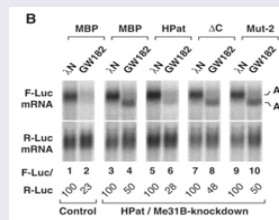
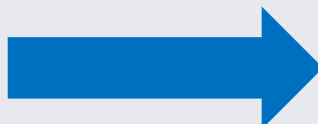
# Data Centric Papers

27.11.2004

The impact of MAPK-ERK1 co-clustering on ERK1 mediated Ext nuclear translocation

- previous data showed that MAPK co-clustering results in inhibition of the ERK signaling pathway → does MAPK ultimately repress Ext nuclear translocation?
- 12 plates of RBL cells were primed with IgE and then stimulated with IgG (low) or G63 (high) DNP for 0, 30, 1, 2, 5, 10 and 30
- Reaction was stopped by snap-freeze in liquid N<sub>2</sub>
- Cells were lysed in Triton-based buffer and nuclear extracts were obtained from isolated nuclei using Nuclear extract buffer
- Equal amounts of total protein were resolved on SDS-PAGE transferred to nitrocellulose membranes and probed with anti-ERK Ab

Handwritten notes and Western blot images from a lab notebook. The notes describe the experimental setup for studying MAPK-ERK1 co-clustering and its effect on ERK1 nuclear translocation. The blots show ERK1 and ERK2 levels in nuclear and cytosolic fractions under various conditions.



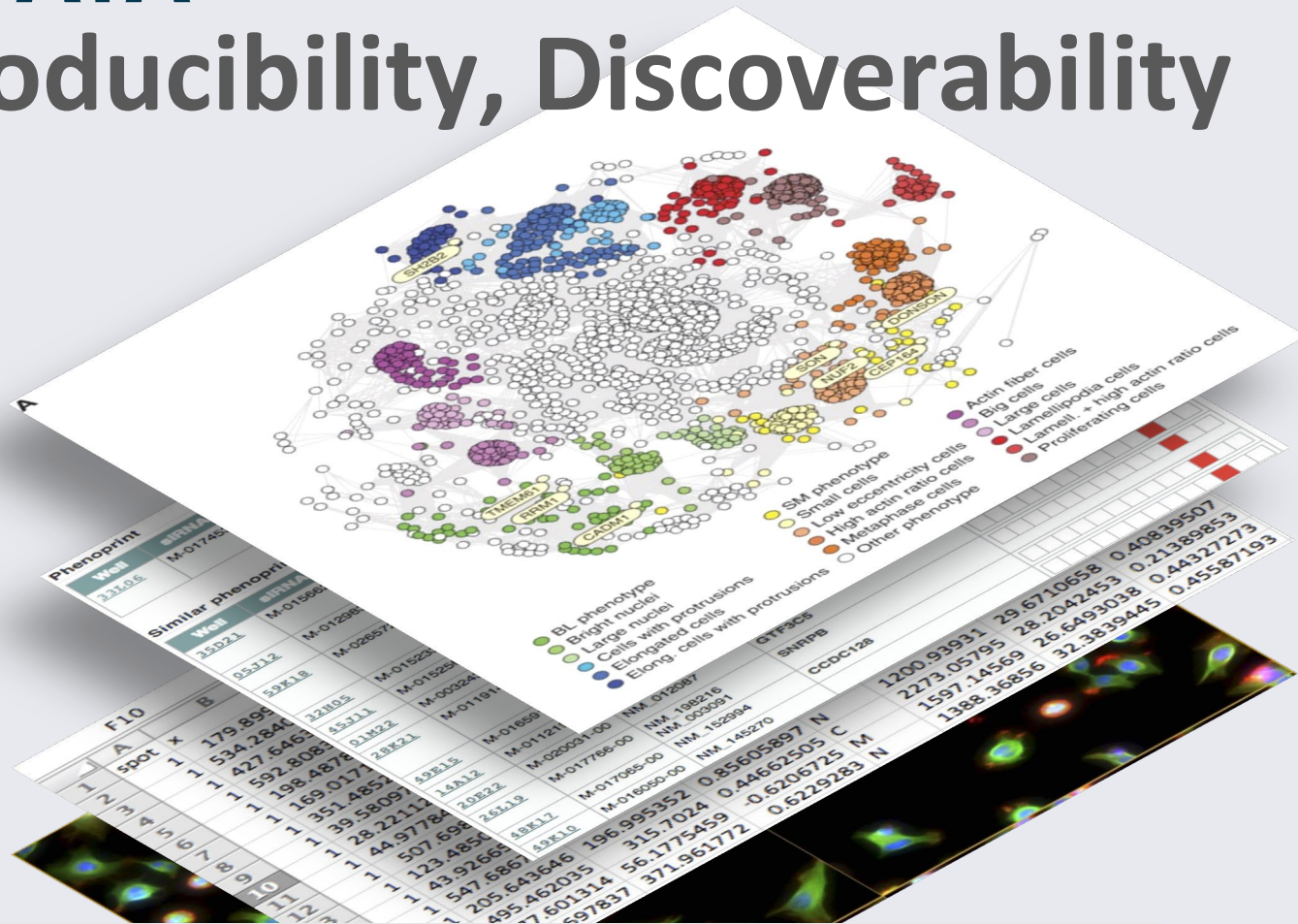
# SOURCE DATA

## Reproducibility, Discoverability

Figure



Source Data



AI based semantic analysis & data directed search

Google Dataset Search Beta

Search for Datasets





# Integration with data repositories

## Paper

**Capturing protein communities by structural proteomics in a thermophilic eukaryote**

Panagiotis L. Kastriitis, Francis J. O'Reilly, Thomas Beck, Yuanyue Li, Matt Z. Rogon, Katarzyna Buczak, Natalie Romanov, Matthew J. Betts, Khanh Huy Bui, Wim J. Hagen, Marco L. Hennrich, Marie-Therese Mackmull, Juri Rappsilber, Robert B. Russell, Peer Bork, Martin Beck, Anne-Claude Gavin

DOI 10.1525/msb.20167412 | Published online 25.07.2017  
Molecular Systems Biology (2017) 13, 936

**Abstract**

The arrangement of proteins into complexes is a key organizational principle for many cellular functions. Although the topology of many complexes has been systematically analyzed in isolation, their molecular sociology *in situ* remains elusive. Here, we show that crude cellular extracts of a eukaryotic thermophile, *Chaetomium thermophilum*, retain basic principles of cellular organization. Using a structural proteomics approach, we simultaneously characterized the abundance, interactions, and structure of a third of the *C. thermophilum* proteome within these extracts. We identified 22 distinct protein communities that include 108 interconnected complexes, which dynamically associate with each other and functionally benefit from being in close proximity in the cell. Furthermore, we investigated the structure of fatty acid synthase within these extracts by cryoEM and this revealed multiple, flexible states of the enzyme in adaptation to its association with other complexes, thus exemplifying the need for *in situ* studies. As the components of the captured protein communities are known—both the protein and complex levels—this study constitutes another step forward

## Database

**BioStudies. EMBL-EBI**

Released 14 February 2017

Systematic analysis of BRAF(V600E) melanomas reveals a role for JNK/C-Jun pathway in adaptive resistance to drug-induced apoptosis

Accession Number: S-EPMC4380931-SODA

Name	Size	Section	Description
Figure 3-B.png	21 KB	Panel B	Image
Figure 3-B.json	4 KB	Panel B	Source Data metadata
source-data-for-fig3-B	16 KB	Panel B	Source Data

## SmartFigure

**Overexpression of Atg5 in mice activates autophagy and extends lifespan**

Intervention: **Atg5** (High)

Assayed: **glucose**

**Upstream** | **Downstream**

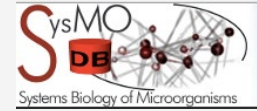
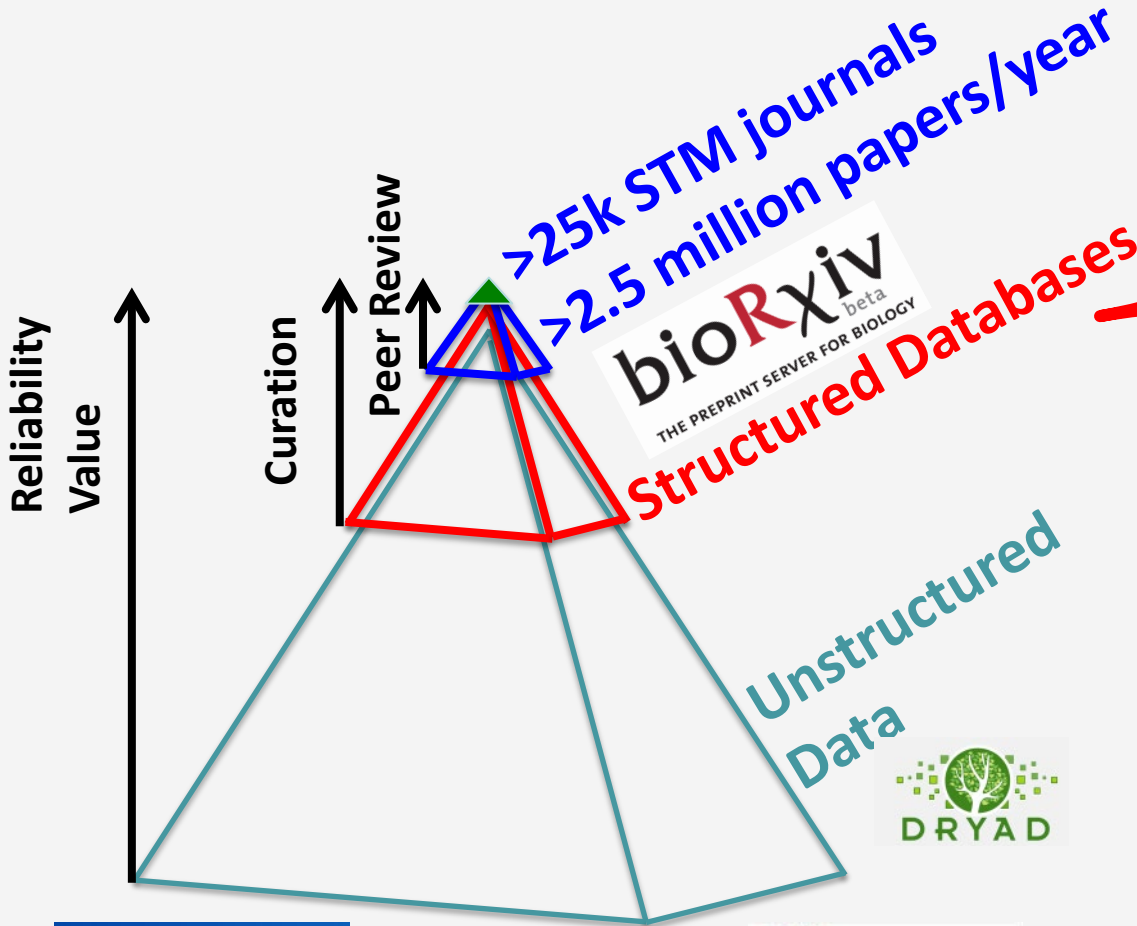
**Similar data**

Time (min)	WT mice	Atg5 <sup>hi</sup> mice
0	~100	~100
15	~40	~40
30	~60	~60
60	~100	~100
90	~120	~120
120	~140	~140

**SOURCE-DATA**  
Making data discoverable



# Open Science



# Reproducible Methods

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

Reagent/Resource	Reference or source	Identifier or catalog number
<b>Experimental models</b>		
C57BL/6j ( <i>M. musculus</i> )	Jackson Lab	B6.129P2Gpr37tm1Dgen/J
DH5alpha ( <i>E. coli</i> )	ThermoFisher	Cat # 18265017
BW29655 ( <i>E. coli</i> )	Zhou <i>et al.</i> , 2003	N/A
NIH 3T3 cells ( <i>M. musculus</i> )	ATCC	Cat #
Liver patient biopsies	Heidelberg University Hospital	N/A
Ap-GAL4 ( <i>D. melanogaster</i> strain)	Bloomington Drosophila	
<b>Recombinant DNA</b>		
pCMV-BE3	Addgene	
pBRAFFV600E ( <i>H. sapiens</i> )	This study	
pBRAFF ( <i>M. musculus</i> )	This study	
pEYFP-Myosin ( <i>D. melanogaster</i> )	J. James lab, Smith <i>et al.</i>	
pSR43.6 (CcaSR)	Schmidl <i>et al.</i> , 2014	
<b>Antibodies</b>		
Rabbit anti-H3	Abcam	
Goat anti-Cy3	Cedarlane	
Mouse anti $\alpha$ -Tubulin monoclonal antibody (clone DM1A)	Sigma Aldrich	Cat #T9026
Rabbit polyclonal anti-Nanog antibody	This study	N/A
<b>Oligonucleotides and other sequence-based reagents</b>		
Cloning oligos	This study	Table 1
PCR primers	This study	Table EV3
siRNA sequences	This study	Table EV5

## Confirmation of interactions by Co-immunoprecipitation

### Approach 1—Endogenous baits and transiently transfected FLAG-tagged preys

Maintain 293T cells in Dulbecco's Modified Eagle Medium (DMEM) containing 10% FBS, 100 IU penicillin and 100  $\mu$ g/ml streptomycin split at 80% confluence. To co-preys, transiently transfect plasmids into the 293T cells. Detect their interactions with anti-GCPR antibodies.

## Antibodies used in co-immunoprecipitation experiments

Santa Cruz: OPRL1 (sc-15309), TSHR (sc-13936), OPRM1 (sc-15310), AGTR1 (sc-1173-G), PTAFR (sc-20732), C5L2 (sc-368573), HRH (sc-20633), CHRM5 (sc-9110), OXTR (sc-33209).

Abcam: ADRB2 (ab36956), HNRPK (ab52600), F2RL (ab124227), TTYH1 (ab57582), PRNP (ab52604), MGLL (ab24701), ATP2A2 (ab2861), FA2H (ab54615), HSPA1B (ab79852).

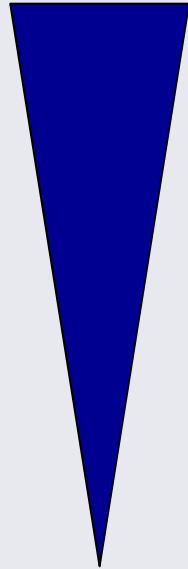
Cell Signaling: GABBR1 (3835).

ProteinTech: GPR37 (14820-1-AP), FZD7 (16974-1-AP).

- Incubate the mixture at room temperature for 30 minutes.
- Prior to adding to cells, vortex the mixture again.
  - 24 hours post-transfection, harvest 2 X 150 mm dishes of 293T cells/plasmid and wash the cells with ice-cold PBS.
  - After that, cross-link the cells with 0.5 mM DSP at room temperature for 30 mins followed by quenching excessive DSP with a buffer containing 0.1 M Tris-HCl, pH 7.5 and EDTA 2 mM.
  - Centrifuge detached cells at 300g for 5 mins.
  - Lyse the cell pellet in RIPA lysis buffer (1% NP-40, 1% Triton X-100, 1% decaethylamine, 5% SDS, 1% NP-200, 1% NP-40, 1% NP-300, 1% NP-600, 1% NP-800, 1% NP-900, 1% NP-1000, 1% NP-1100, 1% NP-1200, 1% NP-1300, 1% NP-1400, 1% NP-1500, 1% NP-1600, 1% NP-1700, 1% NP-1800, 1% NP-1900, 1% NP-2000, 1% NP-2100, 1% NP-2200, 1% NP-2300, 1% NP-2400, 1% NP-2500, 1% NP-2600, 1% NP-2700, 1% NP-2800, 1% NP-2900, 1% NP-3000, 1% NP-3100, 1% NP-3200, 1% NP-3300, 1% NP-3400, 1% NP-3500, 1% NP-3600, 1% NP-3700, 1% NP-3800, 1% NP-3900, 1% NP-4000, 1% NP-4100, 1% NP-4200, 1% NP-4300, 1% NP-4400, 1% NP-4500, 1% NP-4600, 1% NP-4700, 1% NP-4800, 1% NP-4900, 1% NP-5000, 1% NP-5100, 1% NP-5200, 1% NP-5300, 1% NP-5400, 1% NP-5500, 1% NP-5600, 1% NP-5700, 1% NP-5800, 1% NP-5900, 1% NP-6000, 1% NP-6100, 1% NP-6200, 1% NP-6300, 1% NP-6400, 1% NP-6500, 1% NP-6600, 1% NP-6700, 1% NP-6800, 1% NP-6900, 1% NP-7000, 1% NP-7100, 1% NP-7200, 1% NP-7300, 1% NP-7400, 1% NP-7500, 1% NP-7600, 1% NP-7700, 1% NP-7800, 1% NP-7900, 1% NP-8000, 1% NP-8100, 1% NP-8200, 1% NP-8300, 1% NP-8400, 1% NP-8500, 1% NP-8600, 1% NP-8700, 1% NP-8800, 1% NP-8900, 1% NP-9000, 1% NP-9100, 1% NP-9200, 1% NP-9300, 1% NP-9400, 1% NP-9500, 1% NP-9600, 1% NP-9700, 1% NP-9800, 1% NP-9900, 1% NP-10000).



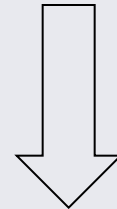
# Research outputs



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

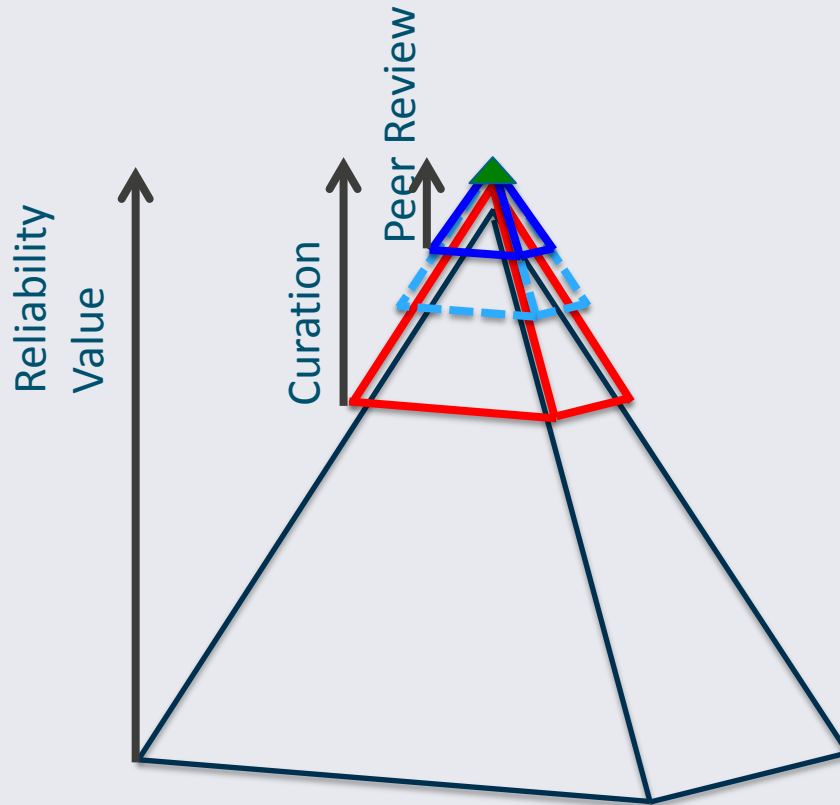


**Institutions  
+  
Publishers**

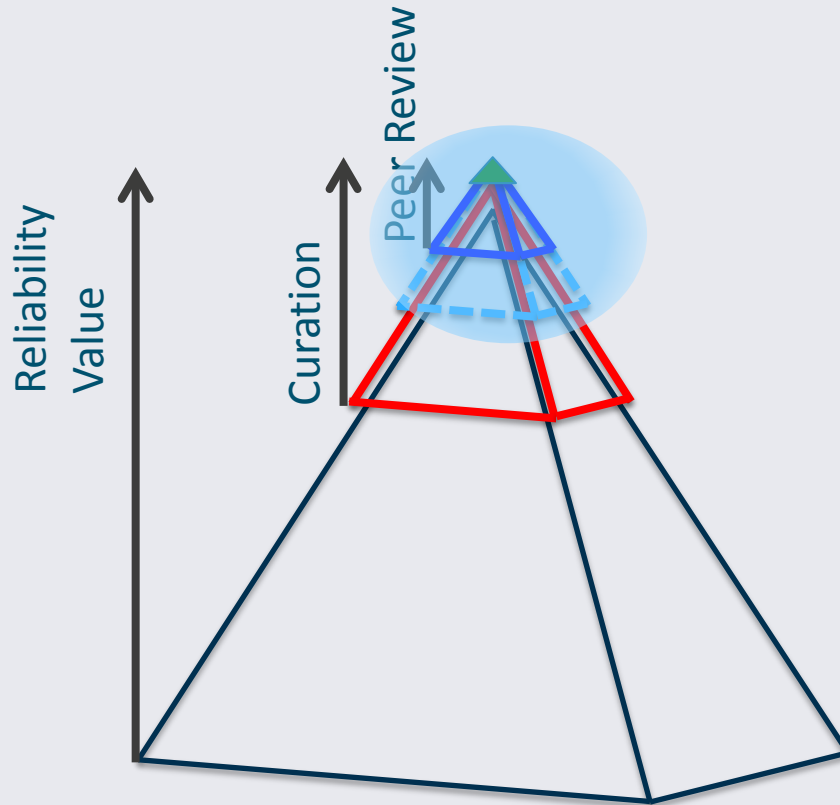


**Standards  
Curation  
Quality control  
Selectivity**

# *Quality* Open Science: how to make it work?



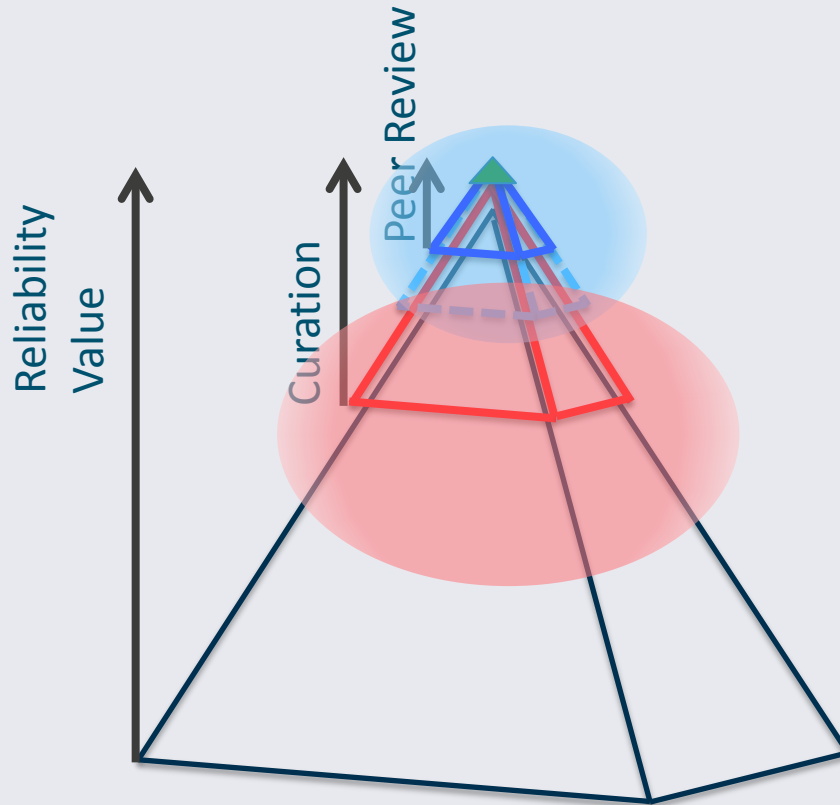
# *Quality* Open Science: how to make it work?



Distributed  
responsibilities:

Journals

# *Quality* Open Science: how to make it work?

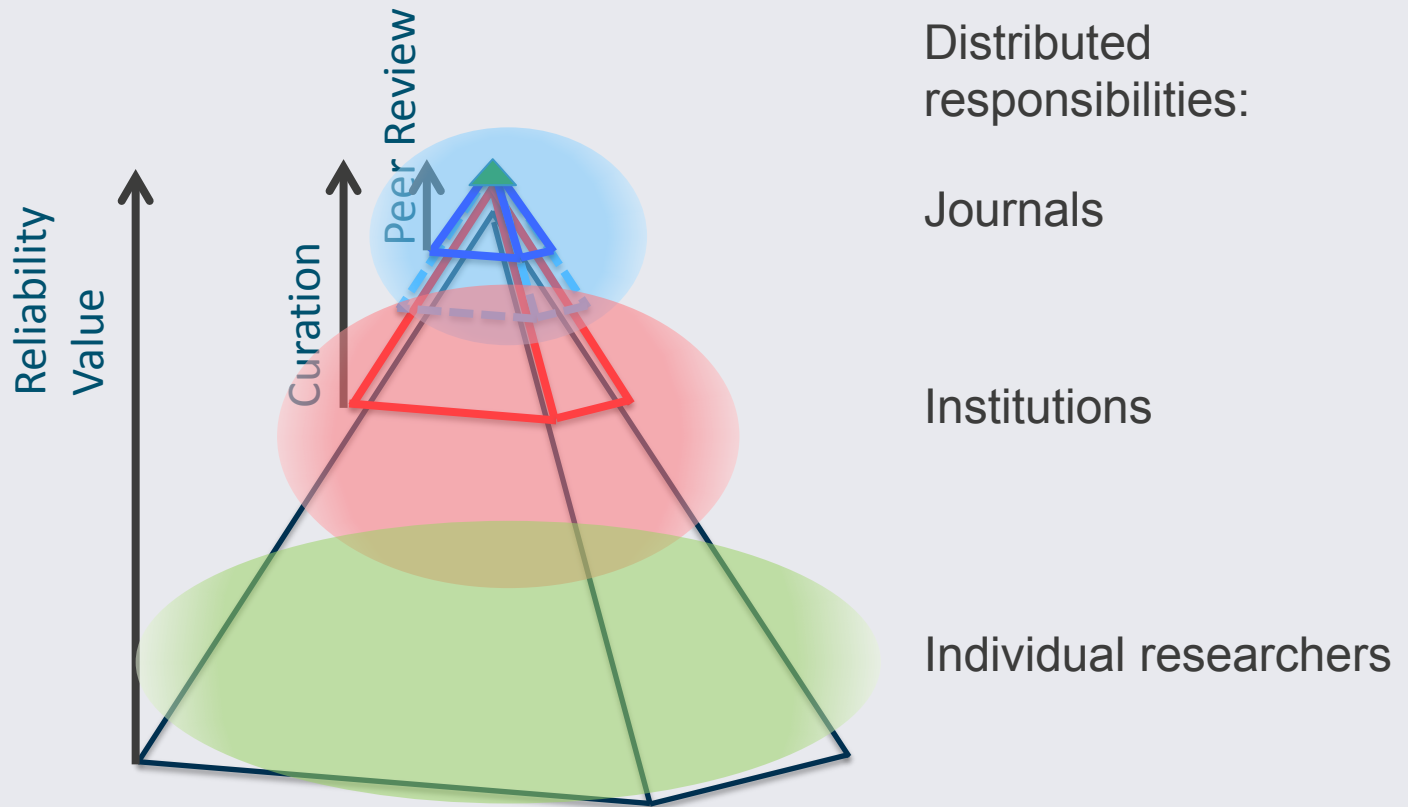


Distributed responsibilities:

Journals

Institutions

# *Quality* Open Science: how to make it work?

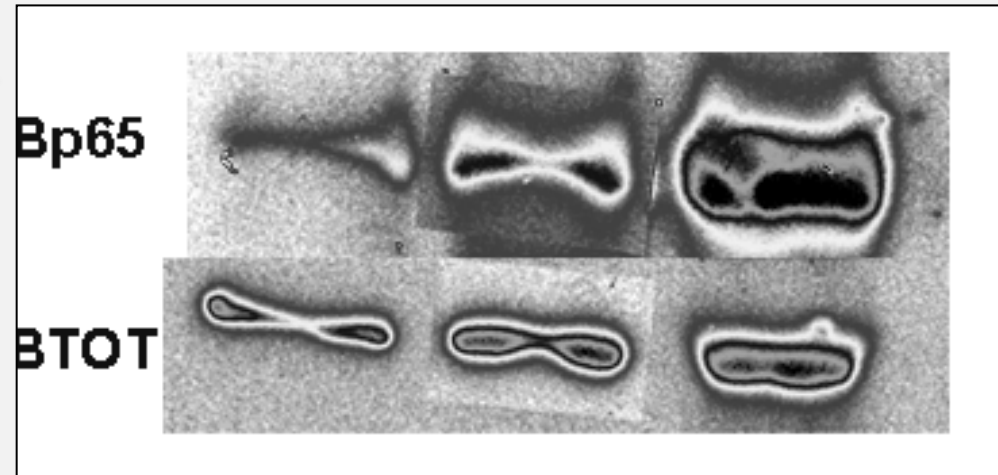




# Ethics

# Scientific Integrity

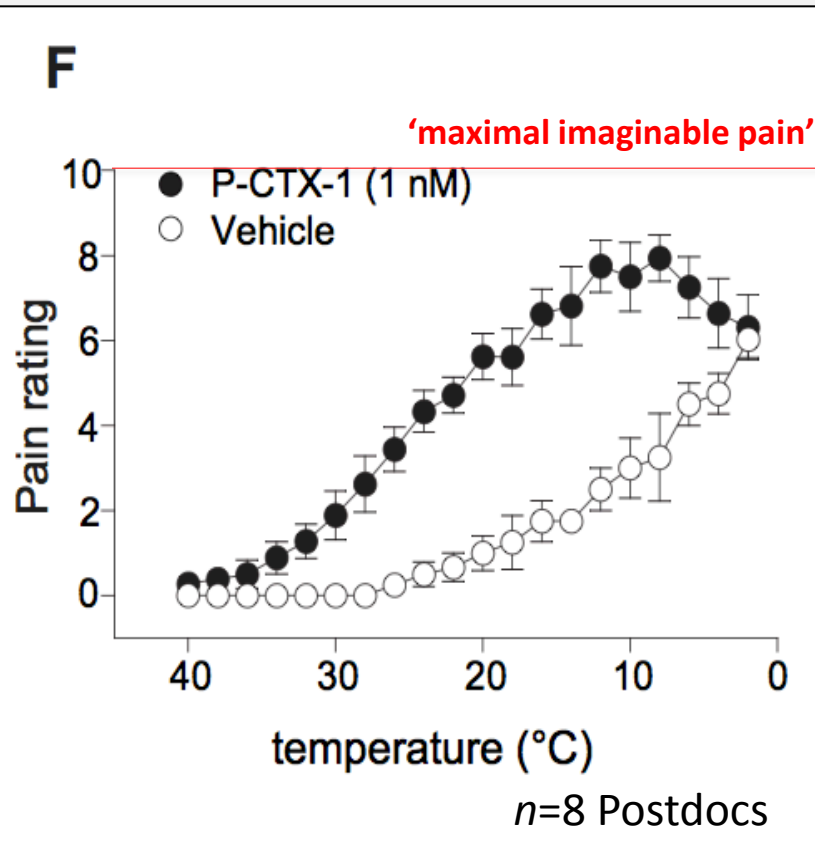
## Image Manipulation



## Plagiarism

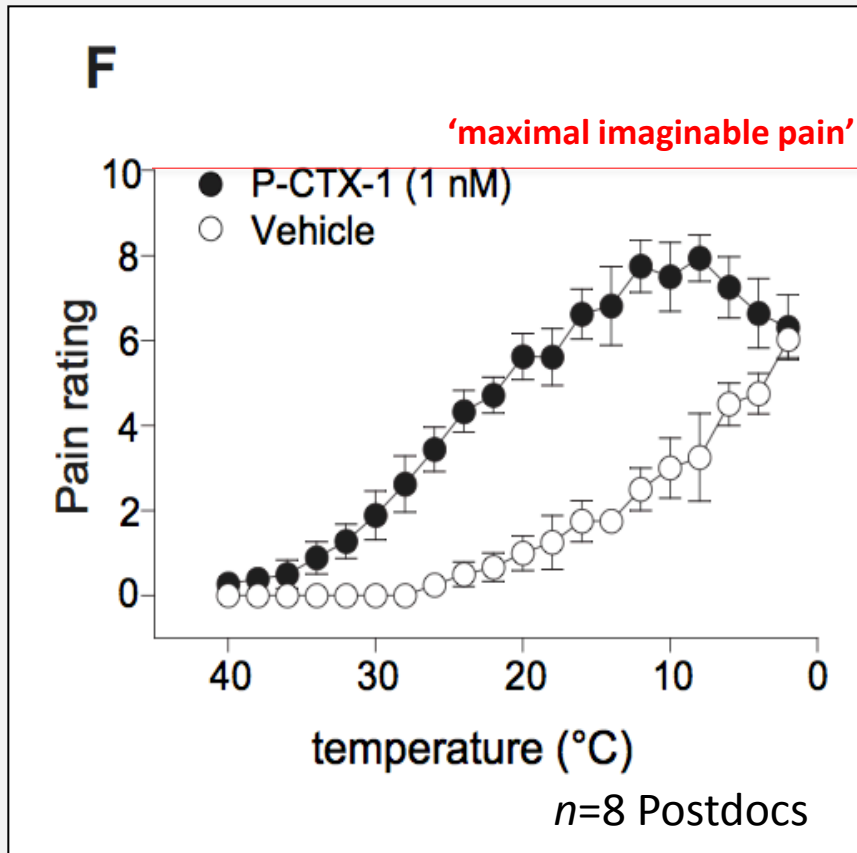
'It was a shock to receive your E-mail but the accompanying "Text comparison report" undoubtedly showed that the plagiarism was happened... I wrote this article in Chinese and sought help from Guangzhou Translation. [Because of the misbehavior of 广州译文, I innocently became guilty of plagiarism.](#)'

**Exclude Methods, Reference Lists**



# Statistics

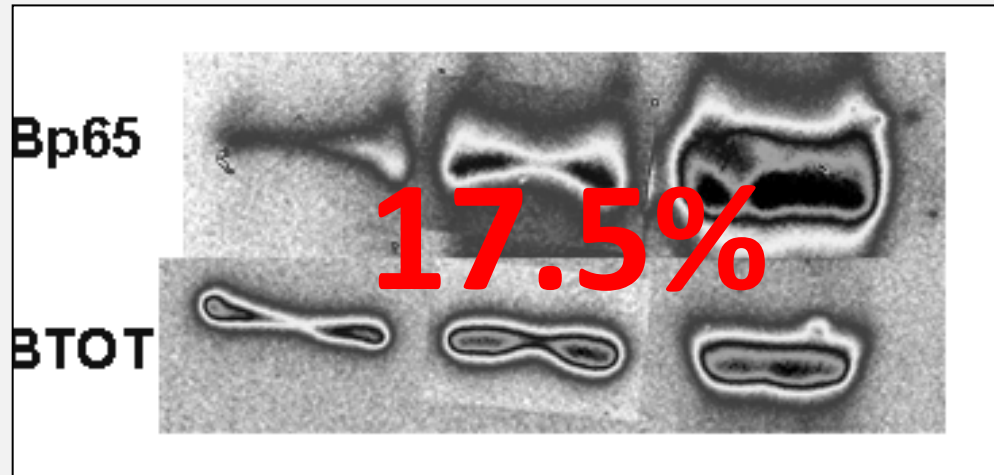
# Ethics



# Statistics

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‘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.](#)’

**Exclude Methods, Reference Lists**

# Quality control saves research \$ and careers

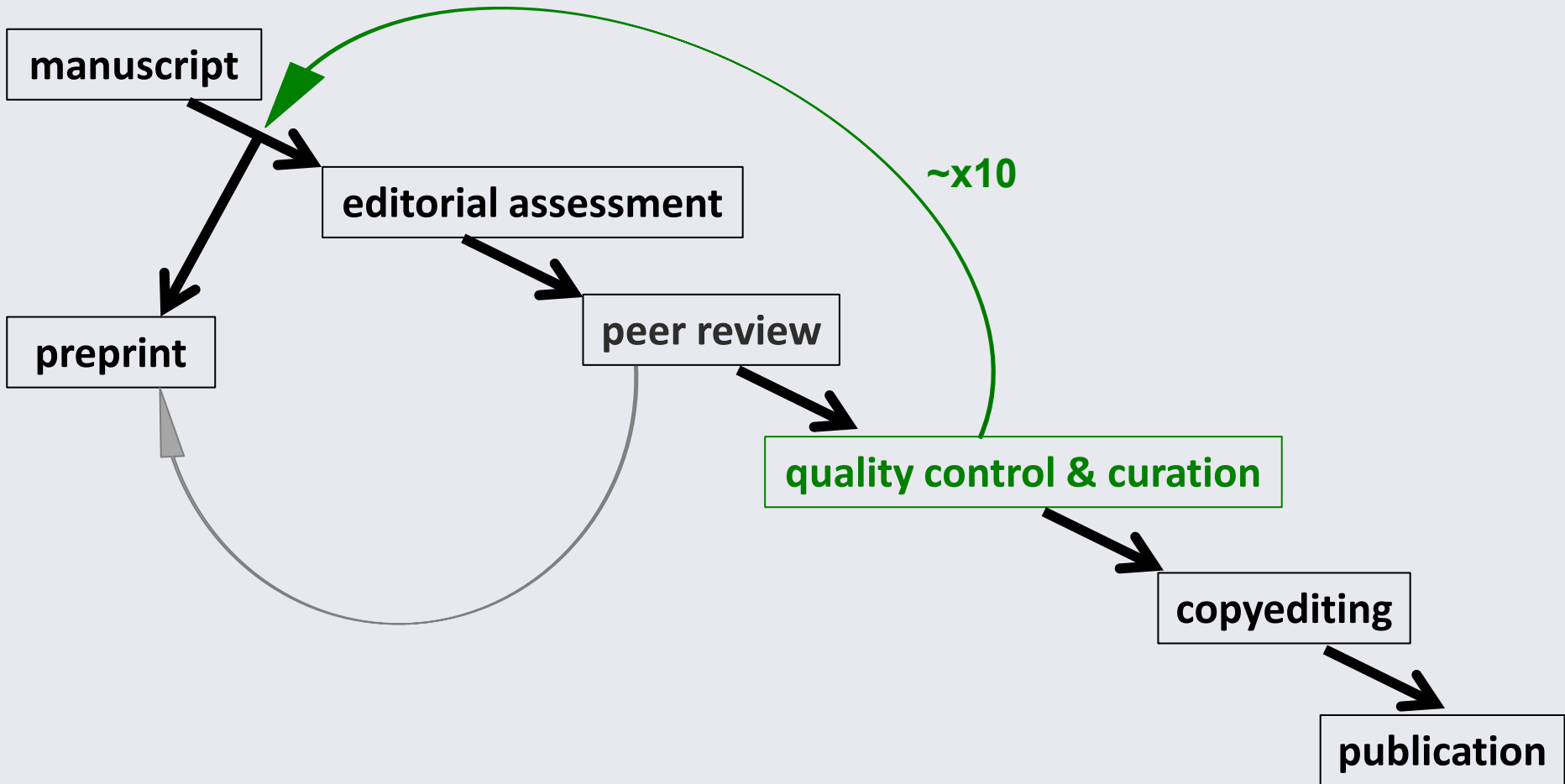


## **Duke University to Pay \$112.5 Million to Settle Claims of Research Mi...**

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.

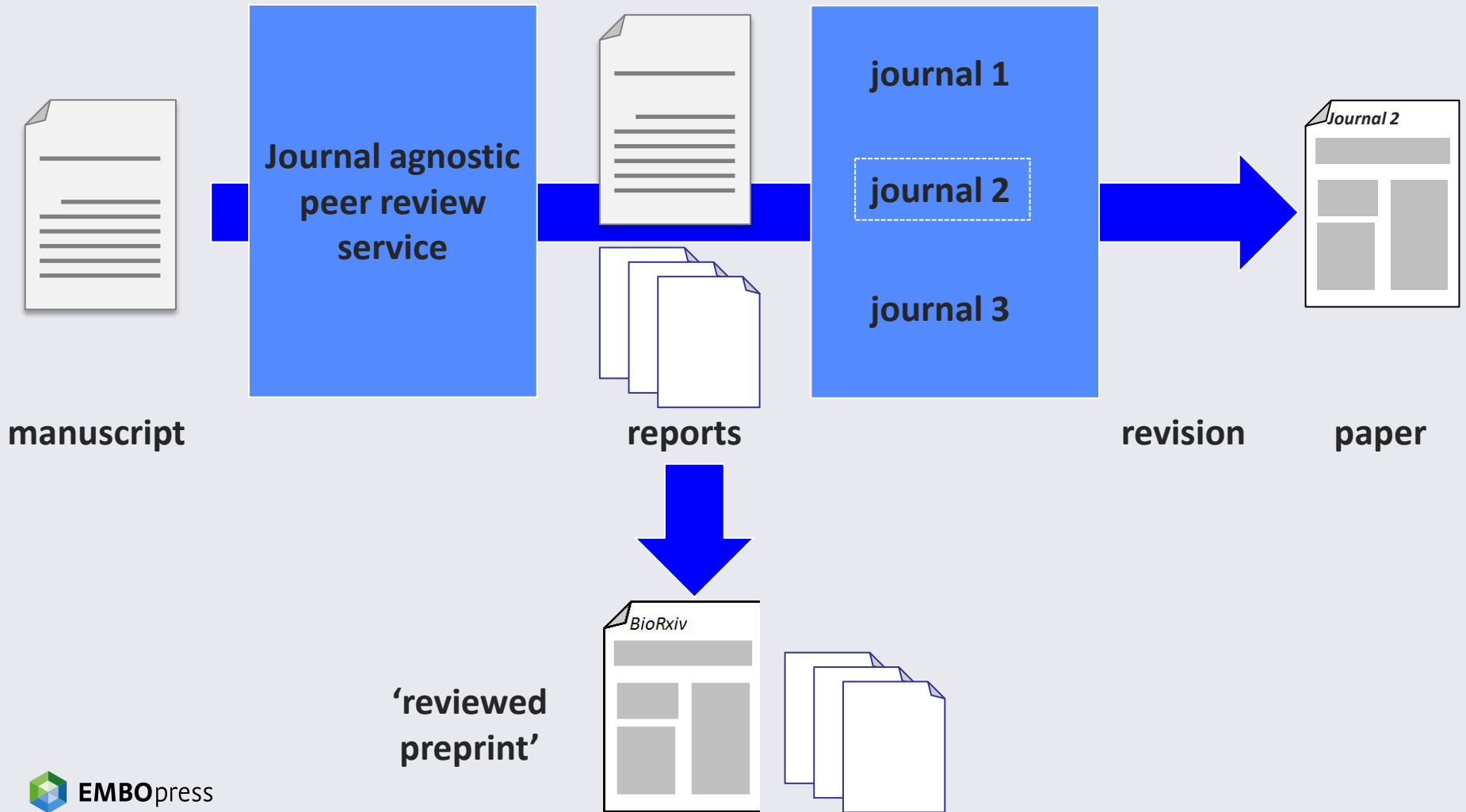
[nytimes.com](https://www.nytimes.com)

# Limit redundancy in quality control



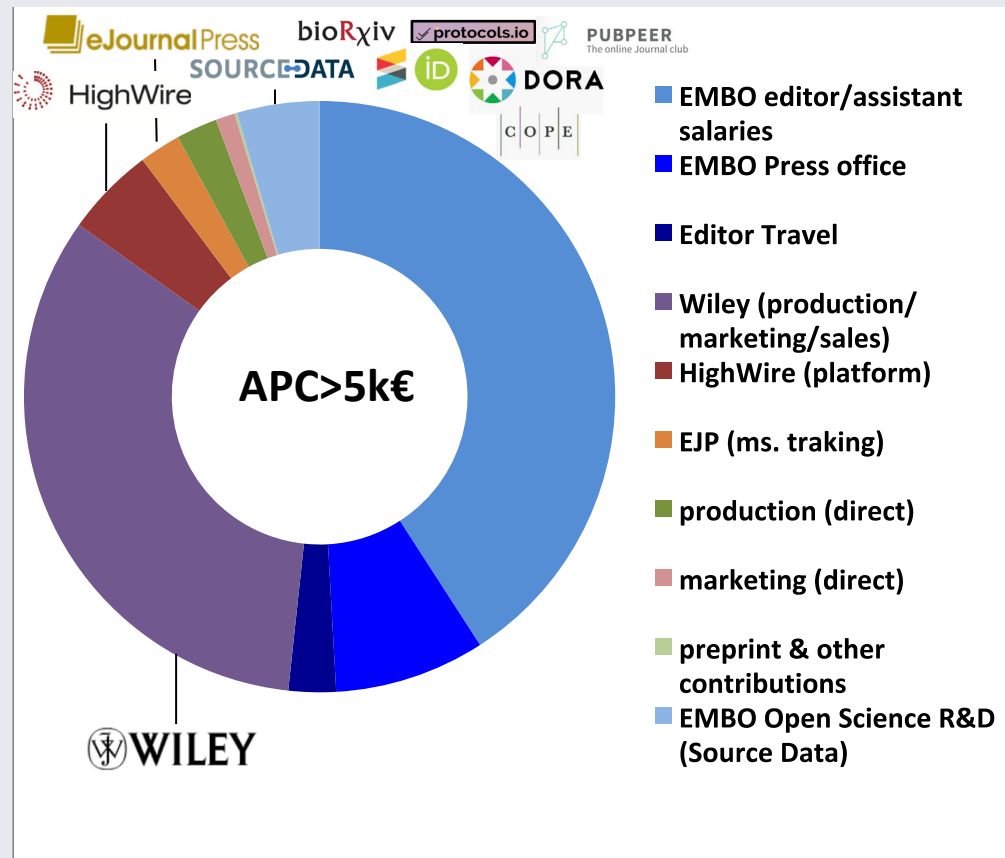
# Pre-Journal review

*one set of referees to publication*



# A key barrier: Publishing cost

Main cost:  
selectivity  
editorial process



Transfers enhance efficiency



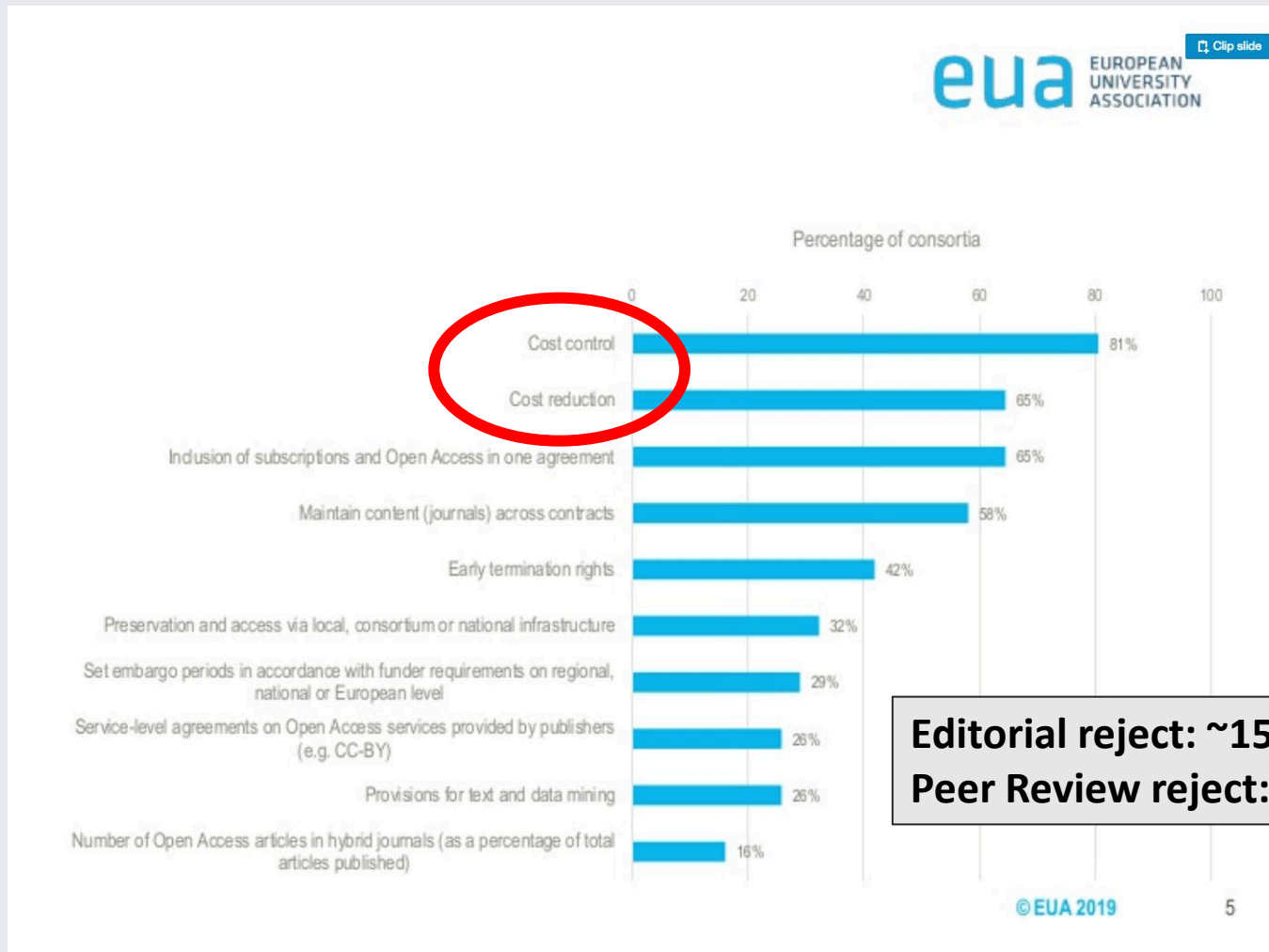
# Perceived Cost of Journal Services

	€ 1k	€ 2k	€ 4k	€ 8k	?
Transparent & fair peer review, detailed decisions	52%	18%	18%	3%	8%
Approachable and responsive editors	38%	28%	22%	4%	8%
Rapid review & decisions	34%	31%	24%	3%	8%
Rigorous editorial process	39%	28%	22%	4%	8%
Professional checking of data presentation, image integrity, text duplication, statistics, etc.	10%	27%	28%	11%	14%
Data deposition & curation	11%	22%	27%	15%	15%
Highlighting of articles	7%	17%	20%	21%	16%

**Community investment: 8h per person per week**

# Different Priorities

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







# 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

	n	$\Sigma$ h/week
editor in chief	10	76
editorial function	83	322
advisor/board	106	274
peer review	157	618
other	11	26
	357	1316

**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*

95% of revisions published

**Fast publication**

Submit in any format

**Easy submission**



**Clear decisions**

Focus on essential experiments – only one round of revision

**EMBO**  
*reports*

THE  
**EMBO**  
JOURNAL

molecular  
systems  
biology

EMBO  
Molecular  
Medicine

[embopress.org](http://embopress.org)

**author-editor  
compact**



TRANSPARENT  
PROCESS

COMMENT · 29 AUGUST 2018

# 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.*

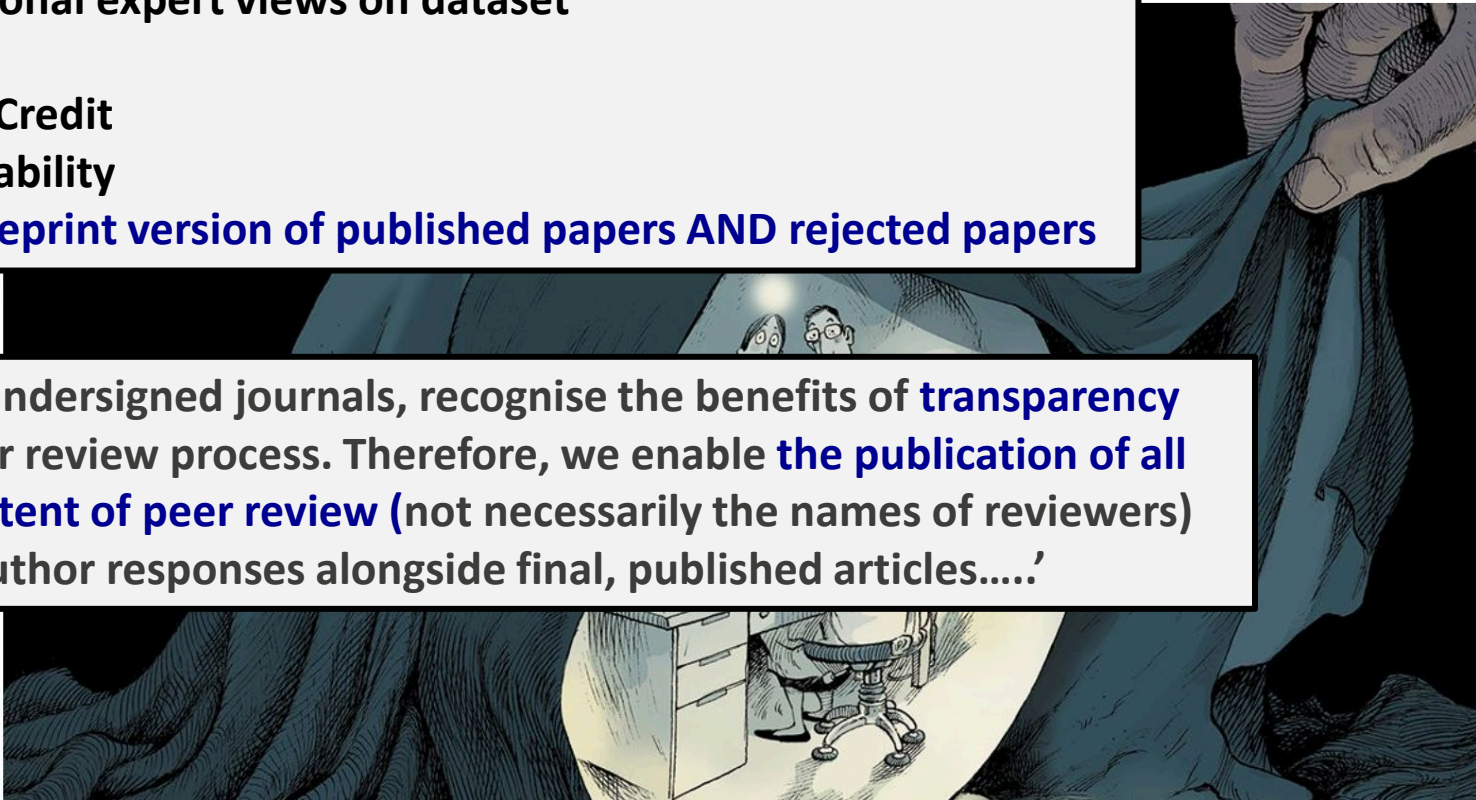
Jessica K. Polka , Robert Kiley, Boyana Konforti, Bodo Stern & Ronald D. Vale

## 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**

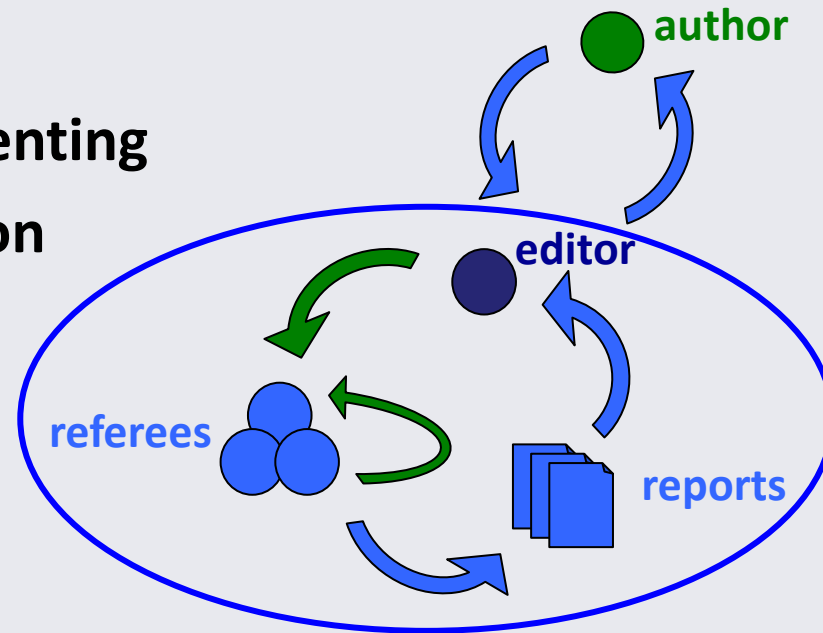
'We, the undersigned journals, recognise the benefits of **transparency** in the peer review process. Therefore, we enable **the publication of all of the content of peer review** (not necessarily the names of reviewers) and the author responses alongside final, published articles.....'





TRANSPARENT  
PROCESS

- Referee Cross-Commenting
- Author Preconsultation



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



# OA at EMBO

**1982**  
**Hybrid**  
**~28% OA**  
6mo self  
12mo free  
DEAL

**2000**  
**Hybrid**  
**~28% OA**  
6mo self  
12mo free  
DEAL

**2005**  
**OA**  
  
APC  
DEAL

2008Hybrid  
**2012 OA**  
  
APC  
DEAL

**2018**  
**OA**  
  
APC

THE  
**EMBO**  
JOURNAL

**EMBO**  
*reports*

molecular  
systems  
biology

EMBO  
Molecular  
Medicine



Life Science Alliance



# 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

<b>Publishing Option</b>	<b>Preprint</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>XL</b>
<b>APC</b>	<b>0.1x</b>	<b>1X</b>	<b>2x</b>	<b>3x</b>	<b>4x</b>
	Published as author-provided PDF	Published as author-provided PDF	Published as author-provided PDF	Published as author-provided PDF	Published as author-provided PDF
	DOI assignment	DOI assignment	DOI assignment	DOI assignment	DOI assignment
	Commenting facility	Commenting facility	Commenting facility	Commenting facility	Commenting facility
		Peer-review	Peer-review	Peer-review	Peer-review
		PubMed indexing	PubMed Indexing	PubMed Indexing	PubMed Indexing
			Indexing in Web of knowledge for citations statistics (Impact Factor)	Indexing in Web of knowledge for citations statistics (Impact Factor)	Indexing in Web of knowledge for citations statistics (Impact Factor)
					Promotion on social media
			Typesetting	Typesetting	Typesetting
			Published as full text HTML/PDF	Published as full text HTML/PDF	Published as full text HTML/PDF
				Search engine optimized	Search engine optimized
				Data curation and deposition	Data curation and deposition
					Copy editing and language editing
					News & View highlights
					Cover image
					Help with graphics design
<b>What is the additional feature would you like to add for an 400 Euro upgrade (excluding peer review)?</b>					

# 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 third analysis on a group of individuals with impaired glucose tolerance from the Framingham Offspring Study, FOS-IGT, who spanned a broader range of fasting insulin concentrations (Table I).

Table II Regression models relating fasting insulin to 2-h metabolite change in individuals with impaired glucose tolerance (FOS-IGT)

Predictor(s)	$R^2_{adj}$	P-value	Prediction error <sup>a</sup>
$\Delta^b$ Leucine/isoleucine	0.36	9E-4	6.65
$\Delta$ Valine	0.17	3E-2	7.74
$\Delta$ Lactate	0.16	3E-2	7.60
$\Delta$ Glycochenodeoxycholic acid	0.14	4E-2	7.86
$\Delta$ Methionine	0.14	4E-2	7.68
$\Delta$ $\beta$ -Hydroxybutyrate	0.14	4E-2	7.90
$\Delta$ Leucine/isoleucine + $\Delta$ glycerol <sup>c</sup>	0.54	7E-5	5.66
PLS <sup>d</sup>	0.46	1E-4	6.89
BMI	0.33	1E-3	6.74

<sup>a</sup>The prediction error is expressed as the root mean square error of prediction (RMSEP), in micro-international units per milliliter insulin.

<sup>b</sup> $\Delta$  denotes log of the 2-h fold change of metabolite levels.

<sup>c</sup>A bivariate model consisting of the 2-h changes in leucine/isoleucine and in glycerol.

<sup>d</sup>Partial least squares based on changes in the 18 validated metabolites.

First, to systematically evaluate the relationship between individual metabolite excursions and fasting insulin, we performed linear regression of the fasting insulin concentration on each of the 18 2-h excursions. Out of the 18, 6 showed a statistically significant ( $P < 0.05$ ) correlation with fasting insulin, and included the excursions in lactate,  $\beta$ -hydroxybutyrate, amino acids (leucine/isoleucine, valine, and methionine), and a bile acid (GCDCA) (Table II). Taken together with the glycerol excursion, which scored ( $P = 0.07$ ) 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 five). Notably, the glucose excursion was not correlated with fasting insulin ( $P = 0.20$ ). These findings suggest that resistance to the action of insulin

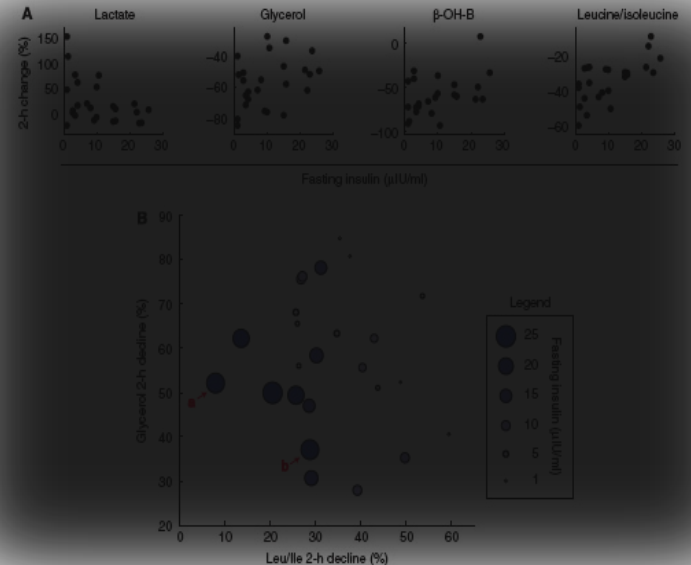
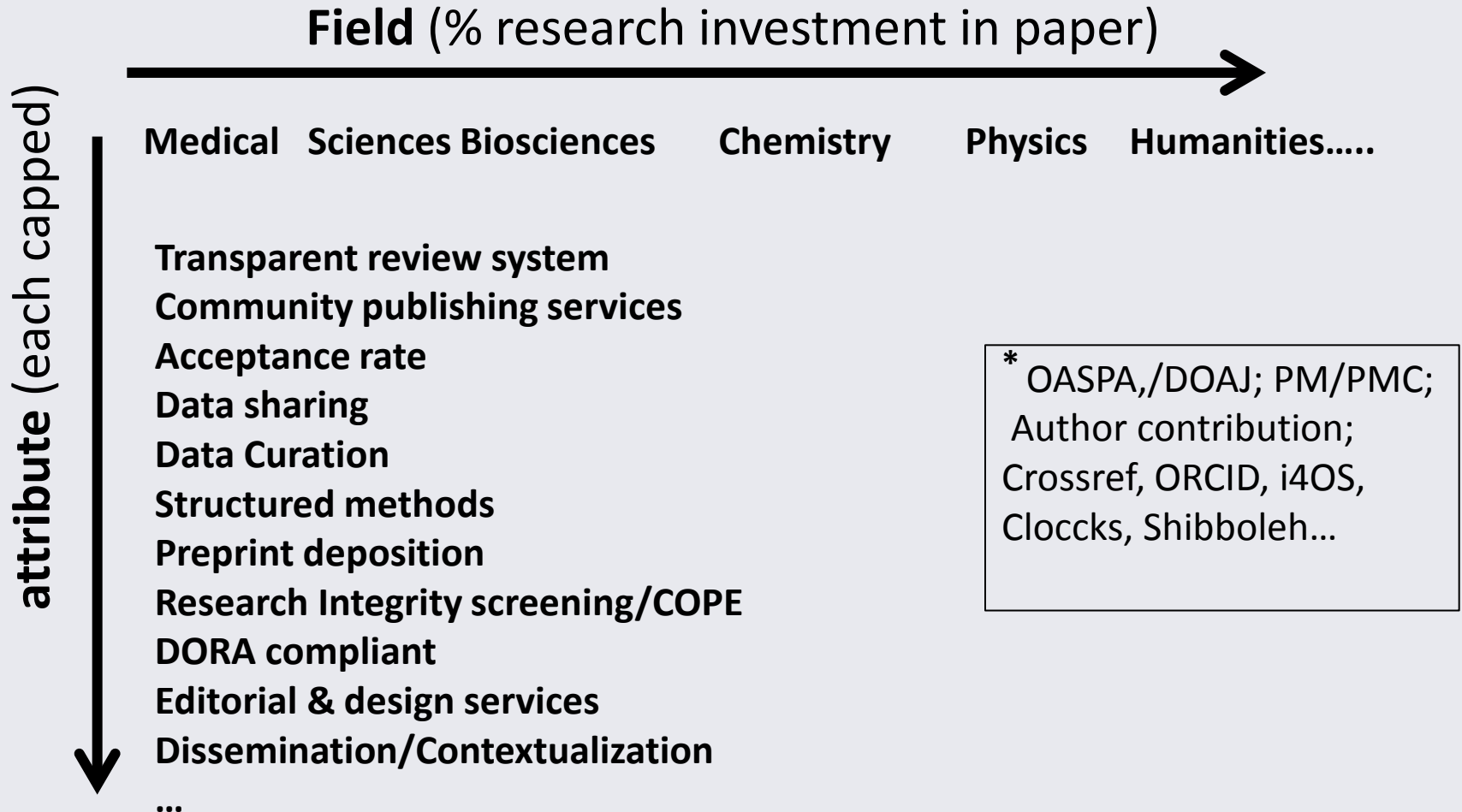


Figure 5 Correlation between fasting insulin and 2-h metabolite changes in individuals with impaired glucose tolerance (FOS-IGT). (A) 2-h changes in markers of insulin action are correlated with fasting insulin concentration. Each dot corresponds to an individual. (B) A bivariate model explaining fasting insulin using the 2-h decline of Leu/Ile and glycerol. Each circle represents an individual, and the circle size is proportional to fasting insulin levels. <sup>a</sup>A representative individual exhibiting a blunted decline in Leu/Ile (resistant to proteolysis suppression). <sup>b</sup>A representative individual exhibiting a blunted decline in glycerol (resistant to lipolysis suppression).

# Differential charges matrix



Baseline: Gold OA/minimal standards\* compliant charge cap  
+ charge supplement:



# 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*

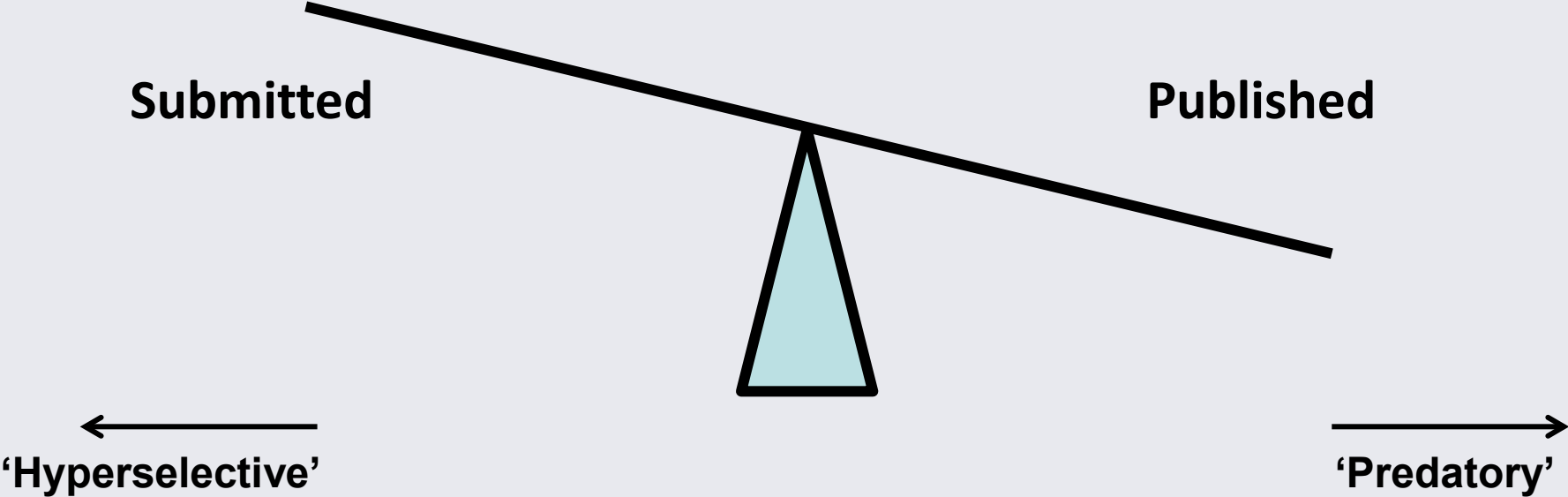
- **No ‘one size fits all’: geography, field, platform**
- **Differential costs for Open Science & Quality attributes**
- **Consider publication costs as % of research costs\***
- **Financial model to include BOTH *published and submitted* research papers\***

\* 2-3% in biomed sciences

\* define

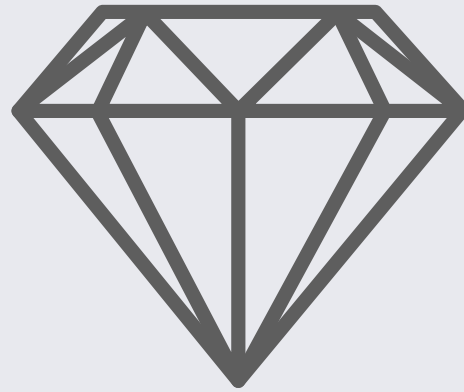
# Solutions: take into account selectivity & avoid gaming

## Selectivity



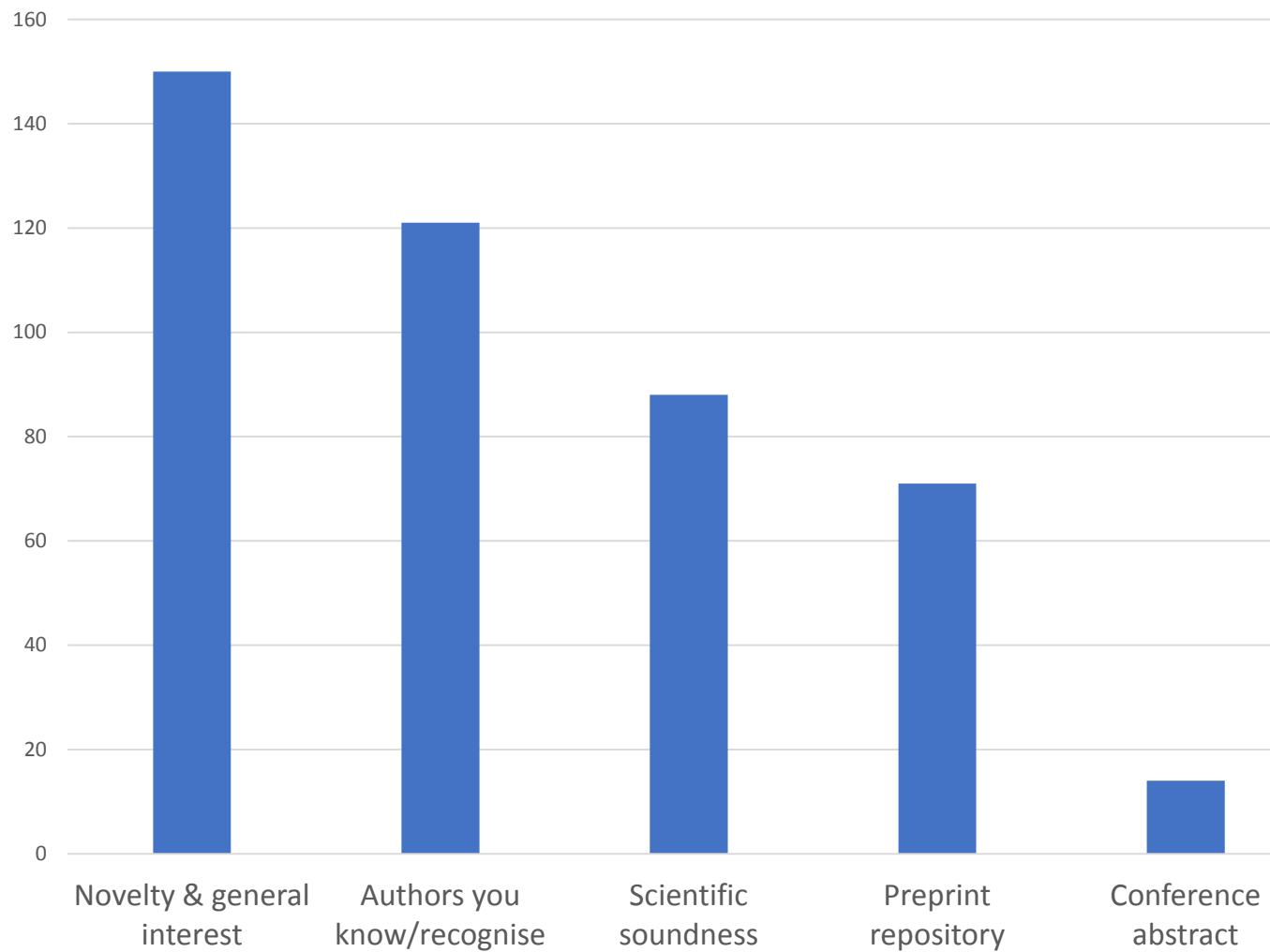
Acceptance rate = Submitted / published

# **Diamond OA and PlanS: how to distribute funding**



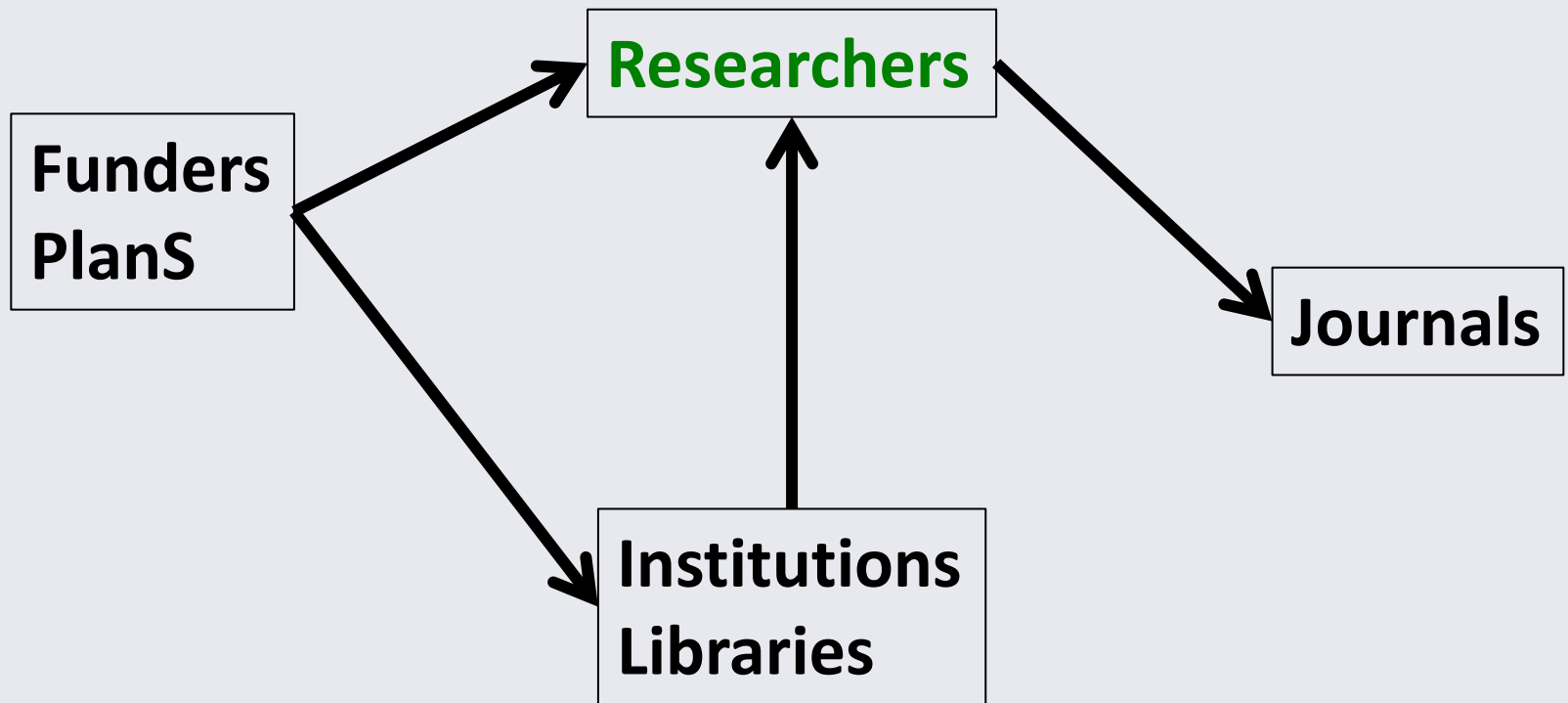
**Journals apply individually to a central PlanS funding scheme,  
that select journals according to transparent quality attributes  
(may assign charge caps according charge matrix)**

# IDENTIFYING PAPERS WORTH READING



# Additional slides

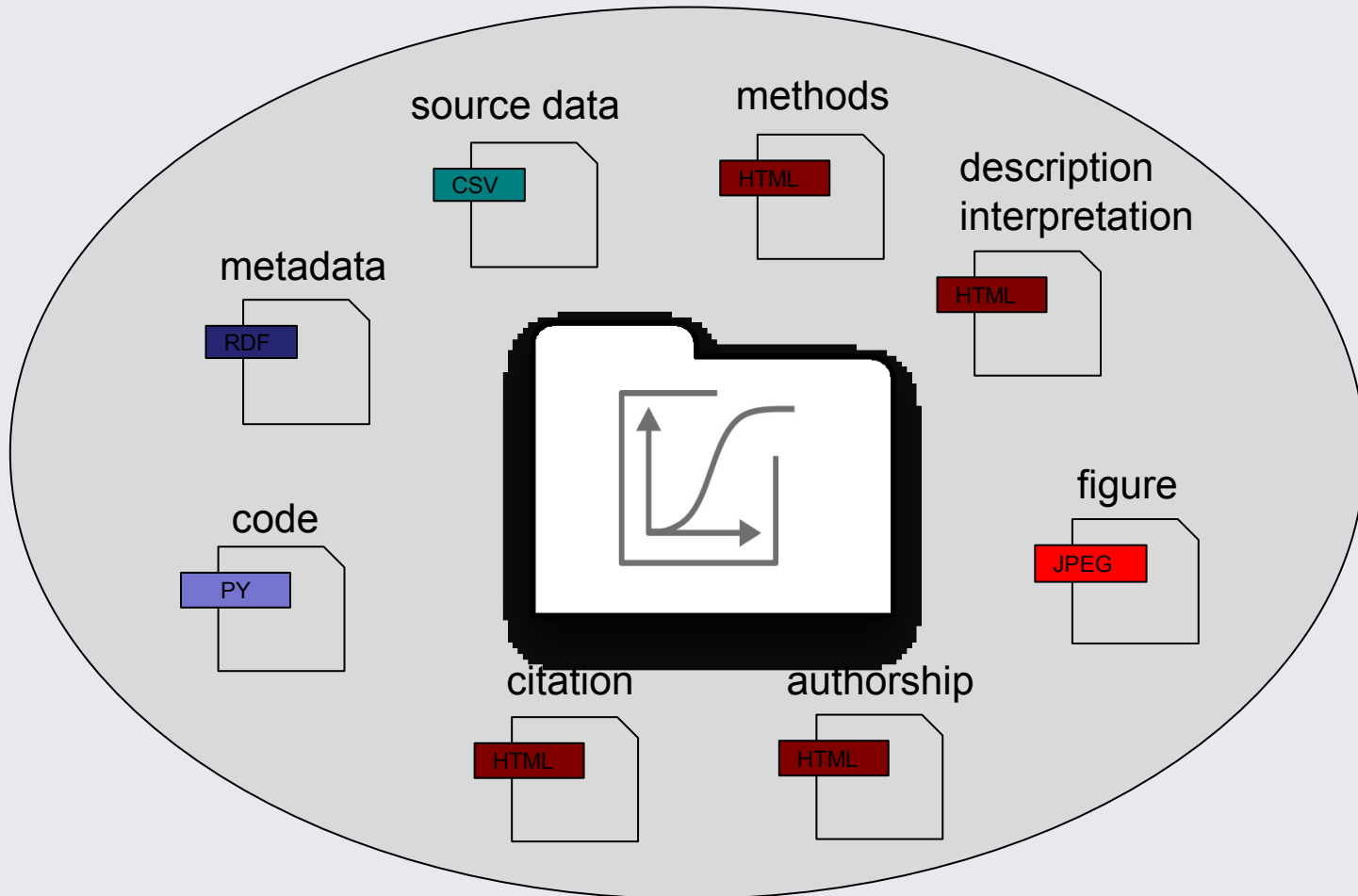
# Top down or bottom up?



**Support models that  
advance Open Science  
through  
quality & selectivity**

# Reproducible & Discoverable Data

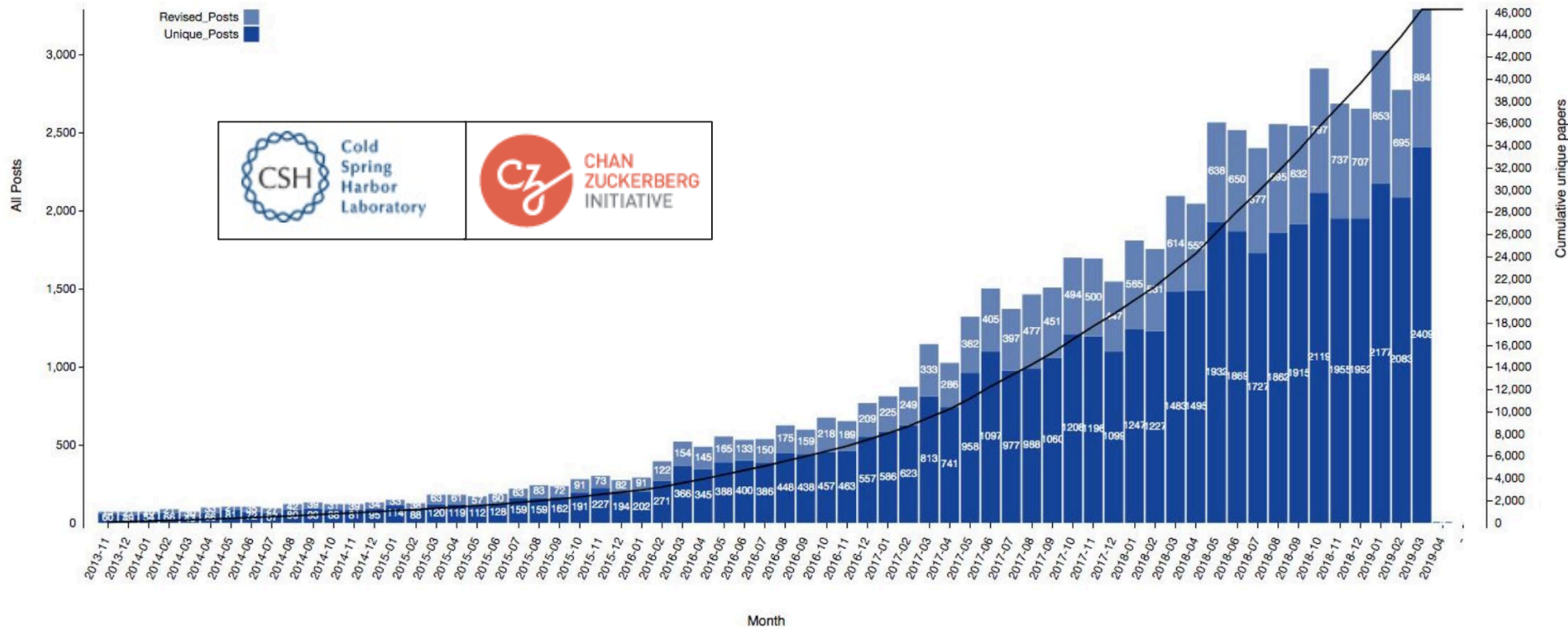
## *Pre-preprints or trusted network*



[Data citation standard]



# Preprints – dissemination before review



**bioRxiv**

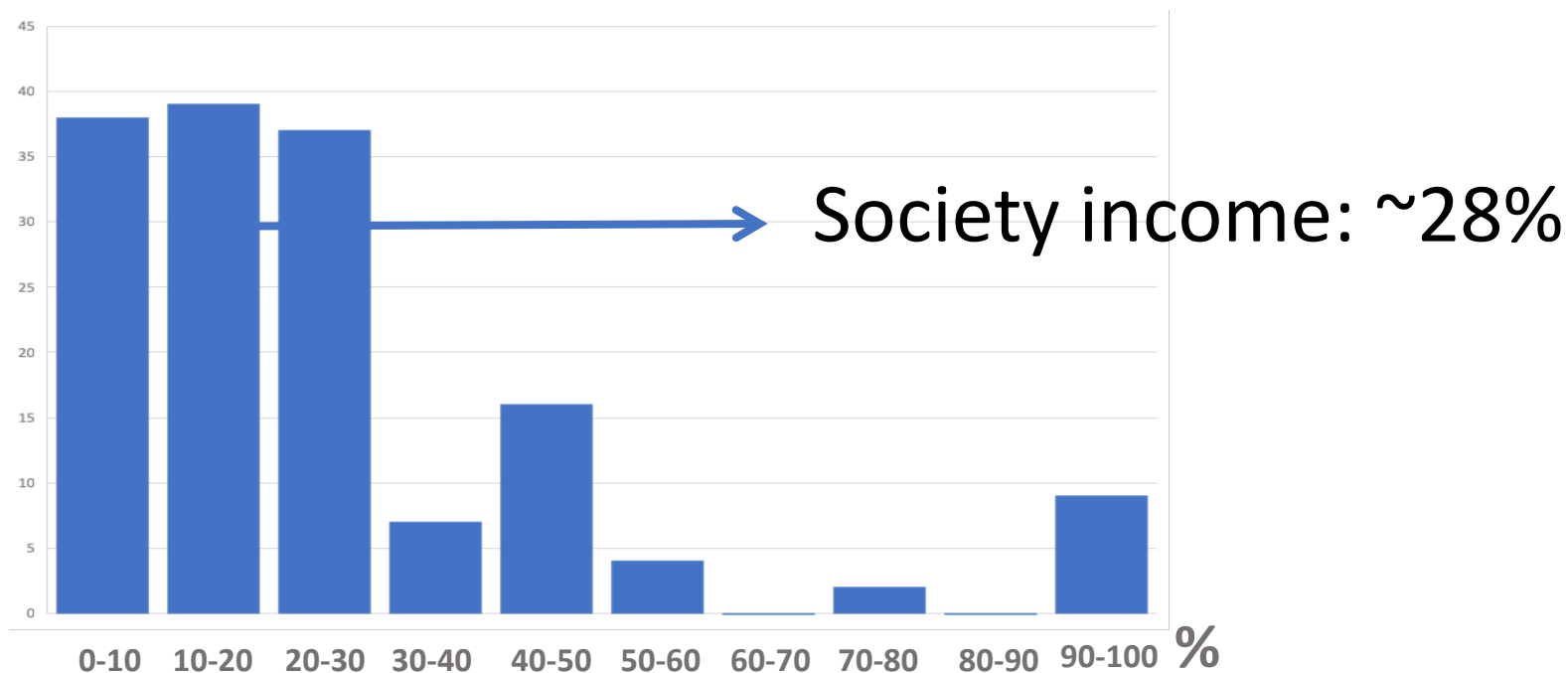
~32,500 preprints (~90% approved; 95% 'new'; 28% revised)

~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?

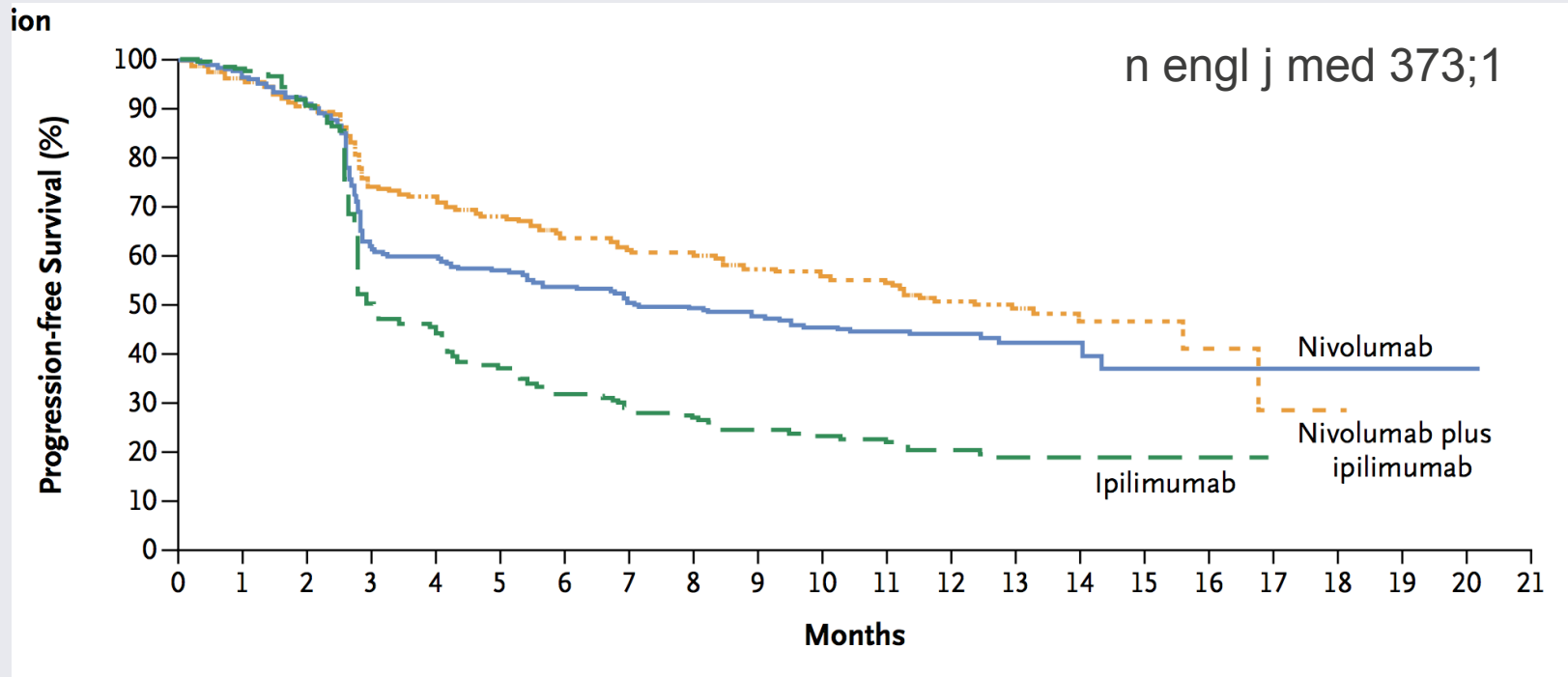


# **Why does OA cost (so much) Journal \$ are for a *service***

**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

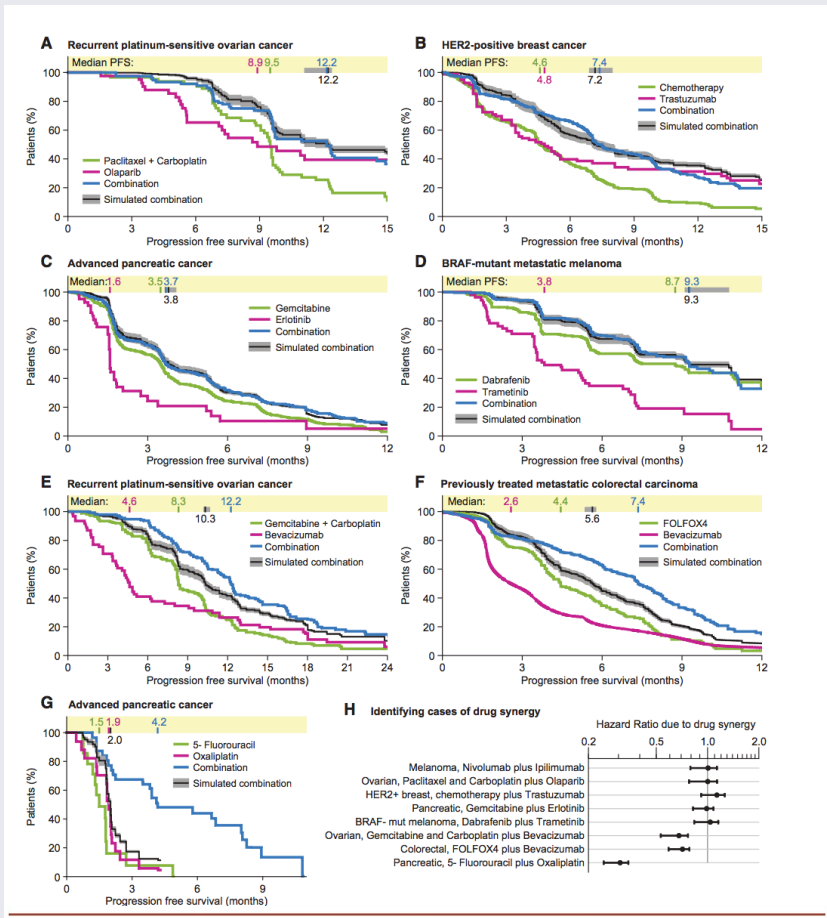


Figure 4. Survival Distributions Observed in Human Clinical Trials of Combination Therapies Are Similar to Those Expected for Independent Drug Action Given the Observed Variability in Response to Monotherapy

Cell

Theory

## Combination Cancer Therapy Can Confer Benefit via Patient-to-Patient Variability without Drug Additivity or Synergy

Adam C. Palmer<sup>1</sup> and Peter K. Sorger<sup>1,2,\*</sup>  
<sup>1</sup>Laboratory of Systems Pharmacology, Program in Therapeutic Science, Harvard Medical School, Boston, MA 02115, USA  
<sup>2</sup>Lead Contact  
 \*Correspondence: peter\_sorger@hms.harvard.edu  
<https://doi.org/10.1016/j.cell.2017.11.009>

### Analysis of human clinical trials

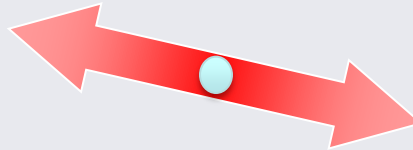
Survival functions for clinical trial data were extracted from published Kaplan-Meier survival curves by image processing (the data are not available in digital form). Survival data published in vector form was processed in Adobe Illustrator to remove censor marks and dashing, and to separate trial arms 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

**17%**

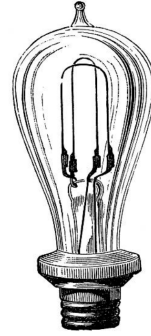
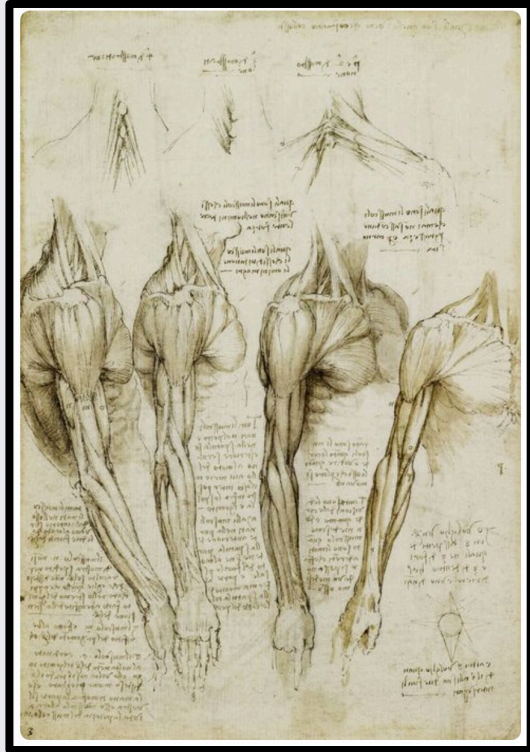


Fabrication  
Fraud

**0.5%\***

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

# Scientific communication



*Discovery!*

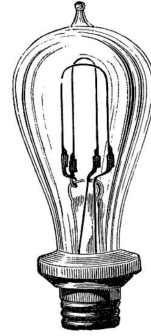
!?



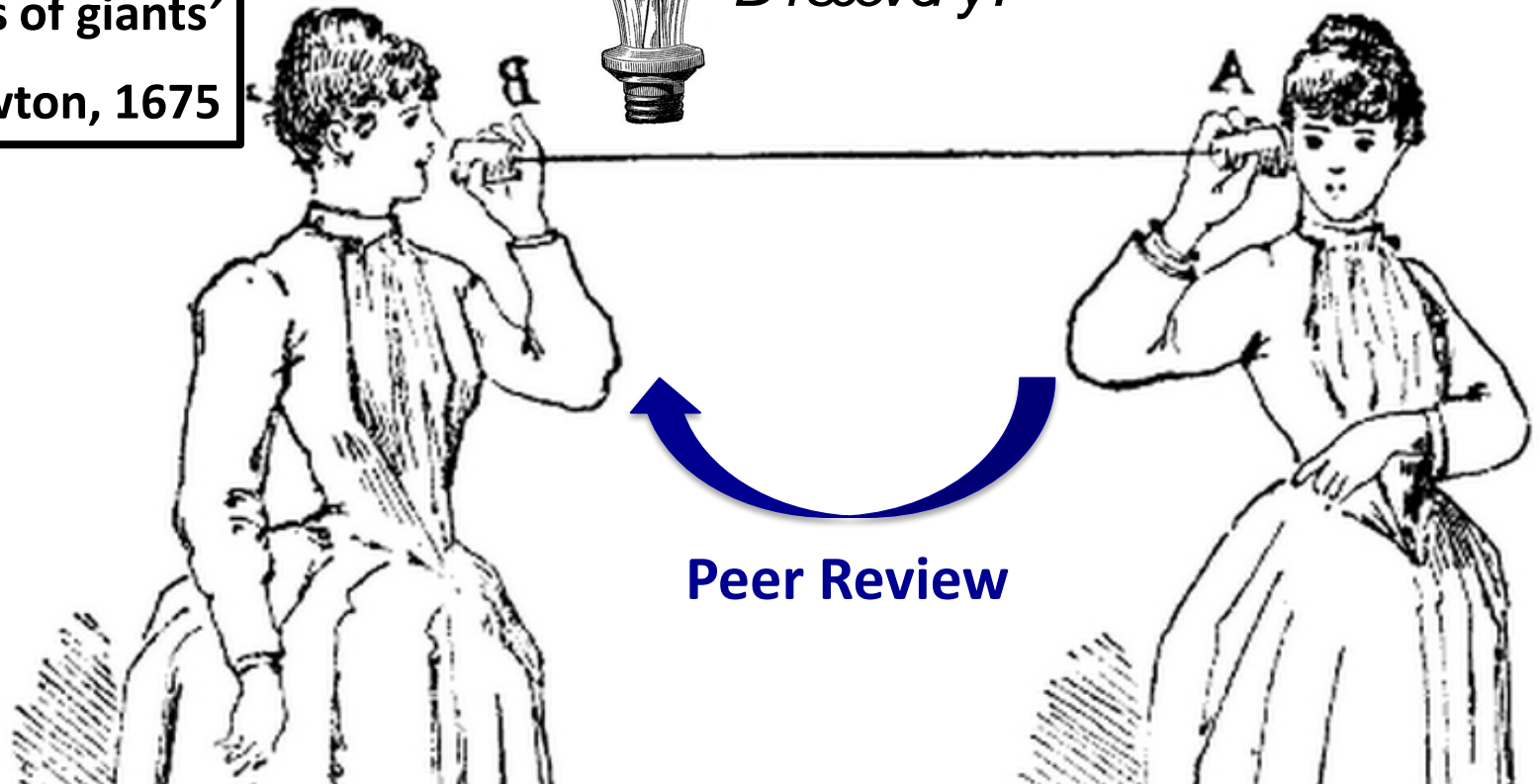
# Scientific communication

'If I have seen further  
it is by **standing** on the  
**shoulders of giants**'

Isaac Newton, 1675



*Discovery!*





World ▶ Europe US Americas Asia Australia Middle East Africa Inequality Cities Global develop

India

# Indian education minister dismisses theory of evolution

Scientists condemn Satyapal Singh for saying Darwin's theory is 'scientifically wrong'

Michael Safi in Delhi

🐦 @safimichael  
Tue 23 Jan 2018  
07:59 GMT



"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

[https://www.theguardian.com/world/2018/jan/23/indian-education-minister-dismisses-theory-of-evolution-satyapal-singh?CMP=share\\_btn\\_link](https://www.theguardian.com/world/2018/jan/23/indian-education-minister-dismisses-theory-of-evolution-satyapal-singh?CMP=share_btn_link)

# Extraordinary *claims* require extraordinary *evidence*

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children Wakefield A. et al. 1998, *Lancet* 351: 637-641

*'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



Andrew Wakefield (R) | Shaun Curry/AFP via Getty Images

## 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

MMR

## 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



▲ Confidence in the measles, mumps and rubella (MMR) vaccine was damaged following discredited claims linking it to autism. Photograph: Alamy Stock Photo

**Sarah Boseley** Health editor

NEWS

## 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

The New York Times

13 March 2019

## *Vaccine Law Returns to Force in Italy, Barring 300 Children From Kindergarten*

# Journals vs. Alt-Facts



Andrew Wakefield (R) | Shaun Curry/AFP via Getty Images

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Sarah Boseley Health editor

NEWS

## Germany: Measles vaccine could be compulsory for kids

## 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

# Scientific communication

