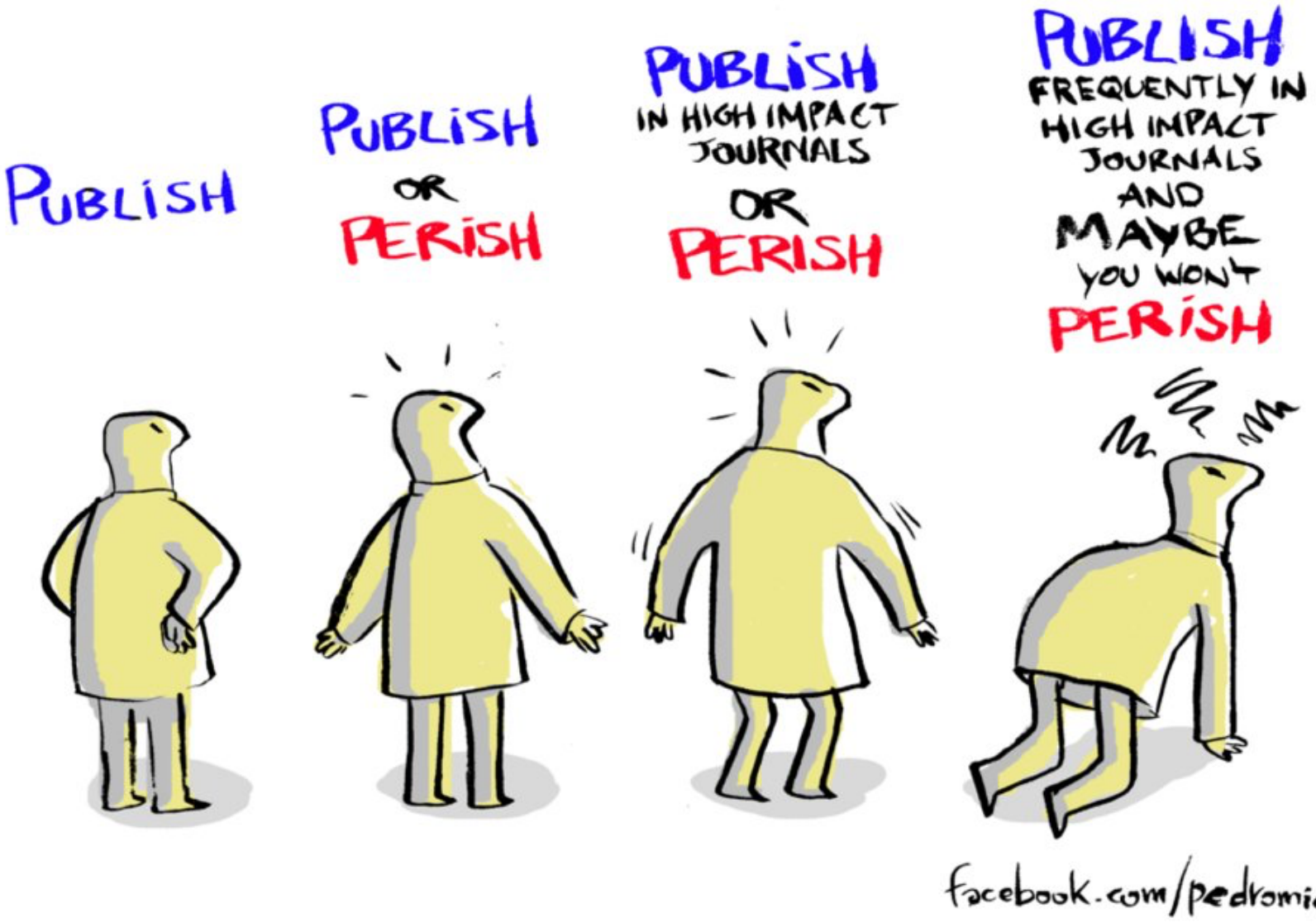
Andrew McMichael and Mariolina Salio, November 3rd 2020

THE EVOLUTION OF ACADEMIA



The Vancouver criteria for authorship

(established by the International Committee of Medical Journal Editors in 1988)

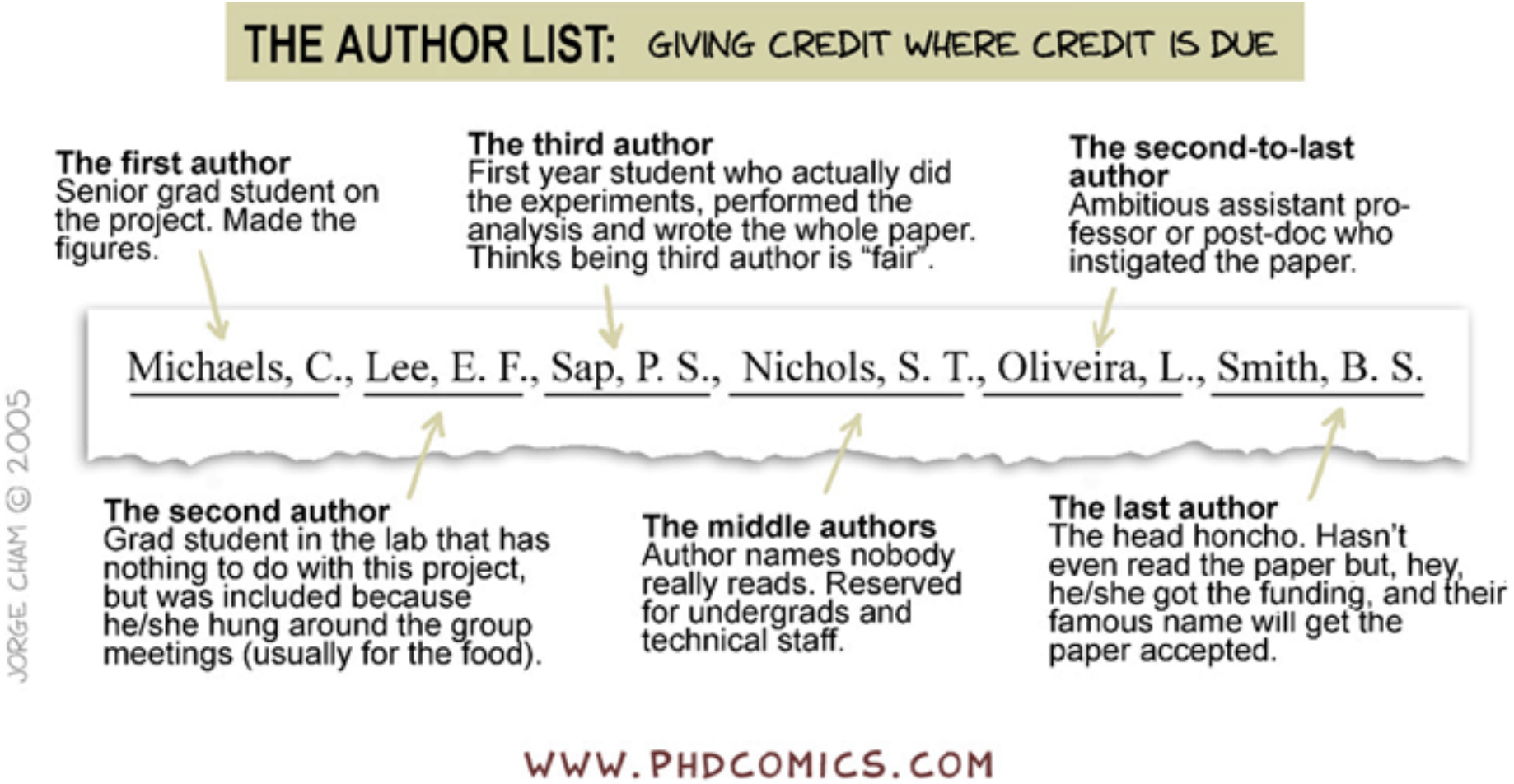
Authors must do all of four things to qualify:

1. play a part in designing or conducting experiments or processing results;
2. help to write or revise the manuscript;
3. approve the published version;
4. and take responsibility for the article's contents.

The International Committee of Medical Journal Editors does not count supervision, mentoring or obtaining funding as sufficient for authorship.

Who goes first, who goes last?

Who goes first, who goes last?



Immunology. 1972 Feb;22(2):277-89.

The effects of ALG on the murine immune response to sheep erythrocytes.

Anderson HR, Dresser DW, Iverson GM, Lance EM, Wortis HH, Zebra J.

J Exp Med. 1978 Jul 1;148(1):84-92.

In a fully H-2 incompatible chimera, T cells of donor origin can respond to minor histocompatibility antigens in association with either donor or host H-2 type.

Matzinger P, Mirkwood G.

The prized places are first and last:

First, the person who does most of the actual experiments and writes the first draft (or whole paper);

last for the senior author who guides (and funds) the project;

Co-first authorship solves many problems and is now recognised by reviewers as genuine. If the experiments represent a more or less equal collaboration between two labs it is usual for one group to take first and one to take last authorship.

In any collaboration, it is important to be very clear right from the start about authorship requirements for any research output.

Potential last authors should be mature enough not to get into disputes!

Middle authors contribute in important ways and know in detail what has been involved. Being a middle author recognises the contribution, which is not trivial. However it is not always simple.

Who to include as middle authors can be contentious;
they must have made a significant contribution
eg gifts of reagents – but depends on terms etc
gifts of ideas - tricky
-> courtesy authorship must be discouraged

Middle authors contribute in important ways and know in detail what has been involved. Being a middle author recognises the contribution, which is not trivial. However it is not always simple.

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they must have made a significant contribution
eg gifts of reagents – but depends on terms etc
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In studies involving clinical samples, the clinician should be considered as a co-author

Consider that most Cell/Nature/Science (and other) papers involve many years of person-work and fields are highly competitive, so not surprising that papers often have more than 10 authors. This is OK!

However, honorary authorship remains common

Guest authors: those who do not meet the criteria but are listed because of superiority, reputation, influence

Gift authors: those who do not meet the criteria but are listed as a personal favour or in return for payment

Ghost authors: those who meet the criteria but are not listed

WORLD VIEW · 25 SEPTEMBER 2018

No more first authors, no more last authors

If we really want transdisciplinary research, we must ditch the ordered listing of authors that stalls collaborative science, says Gretchen L. Kiser.

The assessment of publications during promotion and tenure decisions is a big part of the problem…The gravitas associated with 'first' and 'senior' authorship is entrenched.

Many journals have statements that explain contributors' roles in their publications.

Team science and contributorship are the future. (*Nature* **561**, 464 (2018) *doi: 10.1038/d41586-018-06815-1*

Alphabetical order?

BMJ Yale

HOME | ABOUT |

Search

Comment on this paper

T cell assays differentiate clinical and subclinical SARS-CoV-2 infections from cross-reactive antiviral responses

Ane Ogbe, Barbara Kronsteiner, Donal T Skelly, Matthew Pace, Anthony Brown, Emily Adland, Kareena Adair, Hossain Delowar Akhter, Mohammad Ali, Serat-E Ali, Adrienn Angyal, M. Azim Ansari, Carolina V Arancibia-Carcamo, Helen Brown, Senthil Chinnakannan, Christopher P Conlon, Catherine de Lara, Thushan de Silva, Christina Dold, Tao Dong Dong, Timothy Donnison, David W Eyre, Amy Flaxman, Helen A Fletcher, Joshua Gardner, James T Grist, Carl-Philipp Hackstein, Kanoot Jaruthamsophon, Katie Jeffrey, Teresa Lambe, Lian Lee, Wenqin Li, Nicholas Lim, Philippa C Matthews, Alexander J Mentzer, Shona C Moore, Dean J Naisbitt, Monday Ogese, Graham Ogg, Peter Openshaw, Munir Pirmohamed, Andrew J Pollard, Narayan Ramamurthy, Patpong Rongkard, Sarah Rowland-Jones, Oliver L Sampson, Gavin Screaton, Alessandro Sette, Lizzie Stafford, Craig Thompson, Paul J Thomson, Ryan Thwaites, Vinicius Vieira, Daniela Weiskopf, Panagiota Zacharopoulou, Oxford Immunology Network Covid-19 Response T cell Consortium, Oxford Protective T cell Immunology for COVID-19 (OPTIC) Clinical team, Lance Turtle, Paul Klenerman, Philip Goulder, John Frater, Eleanor Barnes, Susanna Dunachie

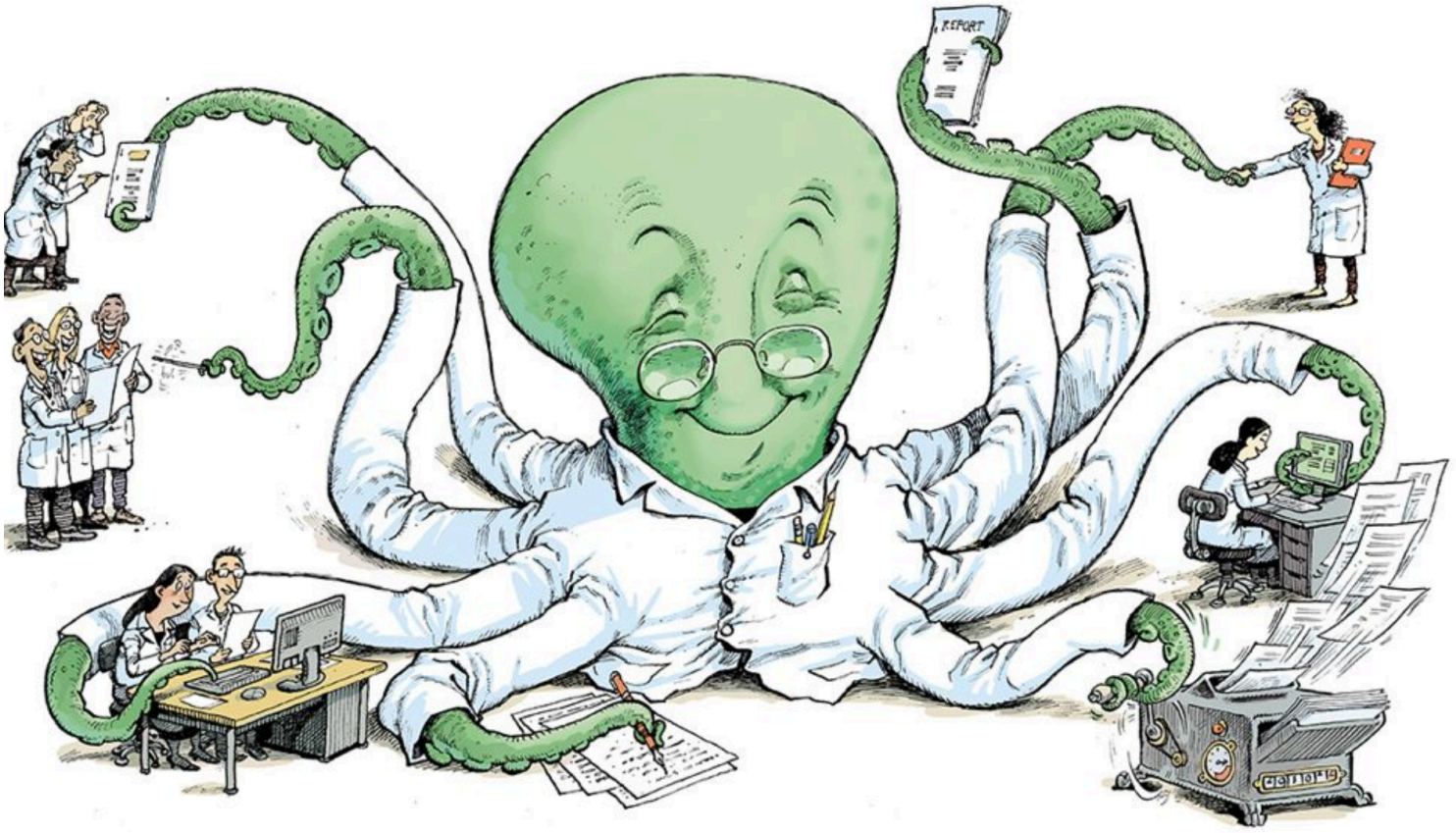
doi: https://doi.org/10.1101/2020.09.28.20202929

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should *not* be used to guide clinical practice.

Abstract | Info/History | Metrics | Preview PDF

Remember, quality not quantity!

Thousands of scientists publish a paper every five days
Nature **561**, 167-169 (2018)



Which journals?

One big article or many smaller?
Sustained CV
Not too many review

Assessing publications

Read them!

Metrics:

Impact Factor of Journal: *calculated by dividing the number of current year* ***citations*** *to source items published in that journal during the previous 2 years.*

PLOS One: 2.8-4.7
PNAS: 9.6
Cell: 36.2
Science: 41.1
Nature: 43.1

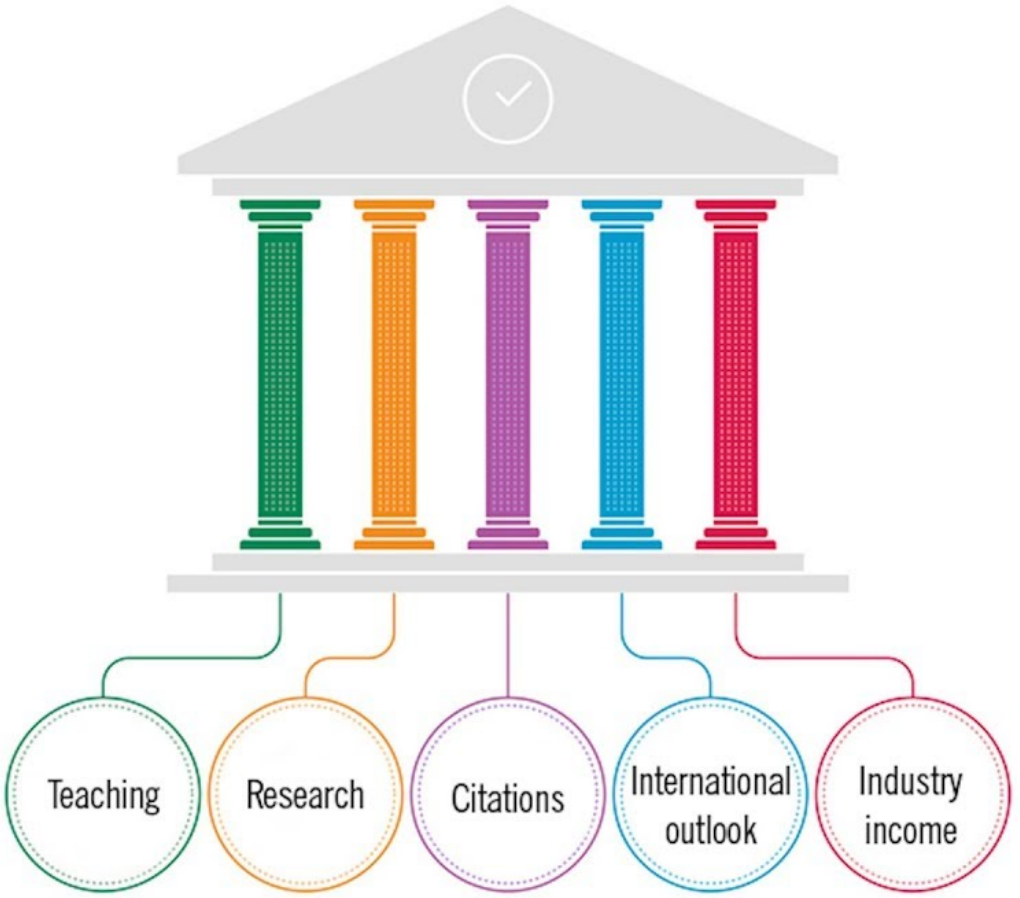
Number of Citations:

0 bad; 20 good; 50 very good; 100 excellent; 1000 outstanding

H index: n publications cited ≥ n times

THE WORLD UNIVERSITY RANKINGS

A quick guide to our methodology



Research integrity at the University of Oxford

https://researchsupport.admin.ox.ac.uk/governance/integrity

Why research integrity/ethics?

> We are funded by public money, charities -> we owe it to the tax payers

> “Clean science” contributes to society advancement

> Ethically guided animal experiments and human studies:
- Experimental design (Reduce/Refine/Replace);
- Consent for human research

> Publications/authorships

Cite as: M. McNutt and R.M. Nerem,
Science 10.1126/science.aan3552
(2017).

Research integrity revisited

Marcia McNutt and Robert M. Nerem

Marcia McNutt is president of the U.S. National Academy of Sciences, Washington, DC, and is the former Editor-in-Chief of *Science*. naspresident@nas.edu

Robert M. Nerem is Institute Professor Emeritus at the Georgia Institute of Technology, Atlanta, GA, and chair of the NASEM Committee on the report *Fostering Integrity in Research*. robert.nerem@ibb.gatech.edu

Recommendations for a new Research Integrity Advisory Board

The research enterprise can enhance its contributions to society in the 21st century by creating conditions that encourage results that meet the highest standards of integrity. All stakeholders must take deliberate steps to strengthen the self-correcting mechanisms and core values of research such as objectivity, honesty, transparency, fairness, account-ability, adherence to standards, and openness.

INTRODUCTION TO SPECIAL ISSUE | INTRODUCTION

Again, and Again, and Again ...

Barbara R. Jasny, Gilbert Chin, Lisa Chong, Sacha Vignieri

Science 02 Dec 2011:
Vol. 334, Issue 6060, pp. 1225
DOI: 10.1126/science.334.6060.1225

REPLICATION—the confirmation of results and conclusions from one study obtained independently in another—is considered the scientific gold standard. New tools and technologies, massive amounts of data, long-term studies, interdisciplinary approaches, and the complexity of the questions being asked are complicating replication efforts, as are increased pressures on scientists to advance their research. This special section, from the 2 December 2011 issue of *Science*, explores some of these challenges. Read the full introduction...

IN FOCUS NEWS

REPLICATION

Biotech giant posts negative results

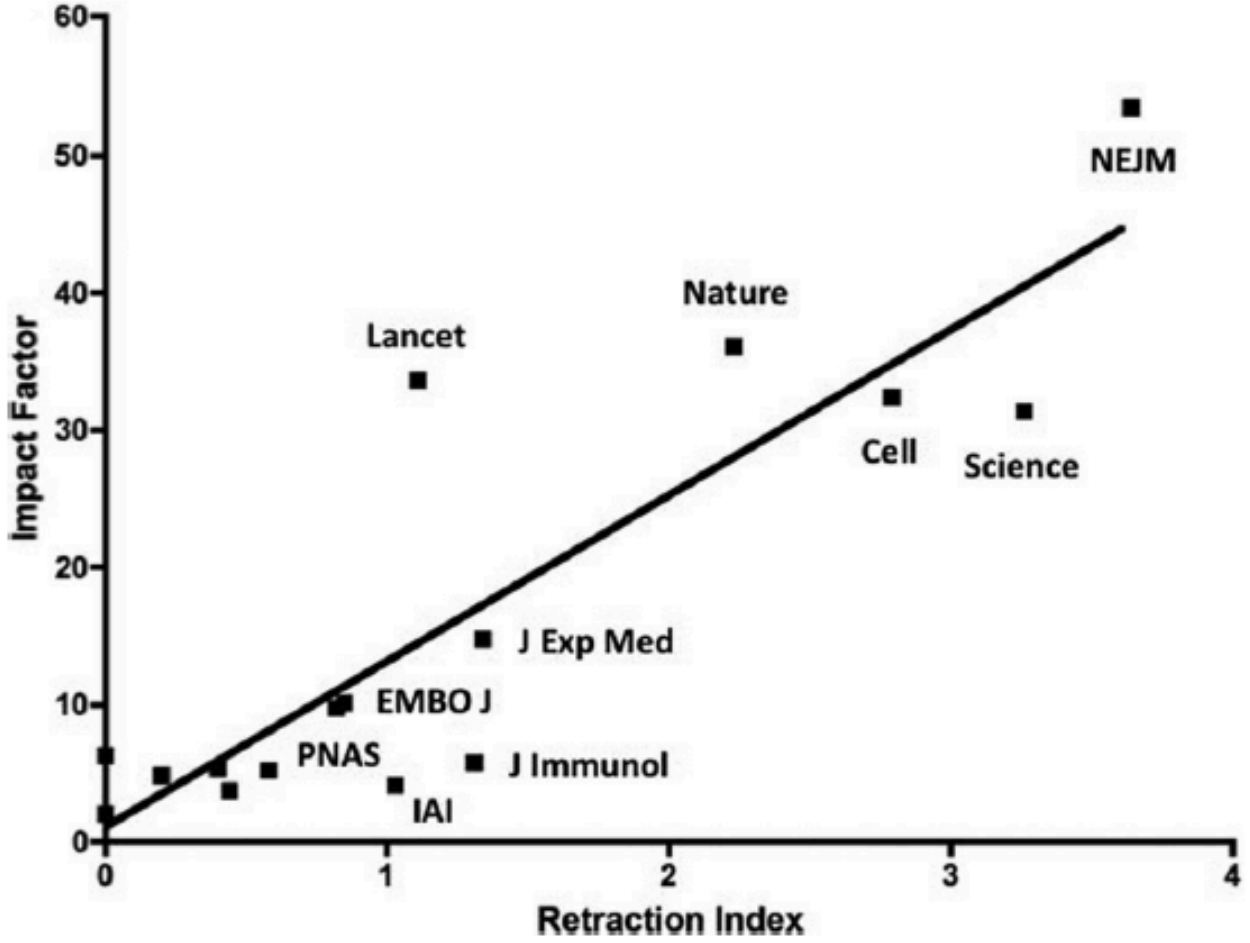
Amgen papers seed channel for discussing reproducibility.

Nature doi:10.1038/nature.2016.19269

they had failed to replicate
47 of 53 landmark cancer papers.

F1000 CHANNEL REPRODUCIBILITY

Retracted Science and the Retraction Index



Fang and Casadevall, Infection and Immunity, 2011, 79: 3855

What are the reasons for this correlation?

Sample size
Weak statistics
Bad reagents
Experimental error
Base broad claims on narrow evidence
Fraud

Pressure to publish papers,
Secure grants;
Criteria for career advancement
Deficiencies in training
Non rigorous reviews and journal practices

C O P E COMMITTEE ON PUBLICATION ETHICS

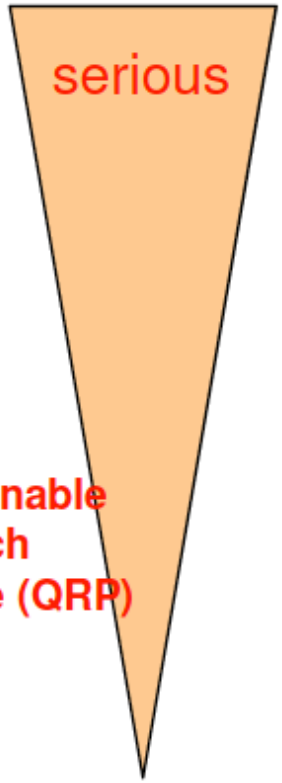
Definitions of Research/Publication Misconduct

- Fabrication
- Falsification
- Plagiarism

FFP
+/- intentional!

- No ethics approval
- Not admitting missing data
- Ignoring outliers
- No data on side effects
- Gift authorship
- Redundant publication
- Inadequate literature search

Questionable Research Practice (QRP)



www.publicationethics.org.uk

From Sabine Kleinert, Oxford, 22.11.2010

PLOS | BIOLOGY

PERSPECTIVE

The Economics of Reproducibility in Preclinical Research

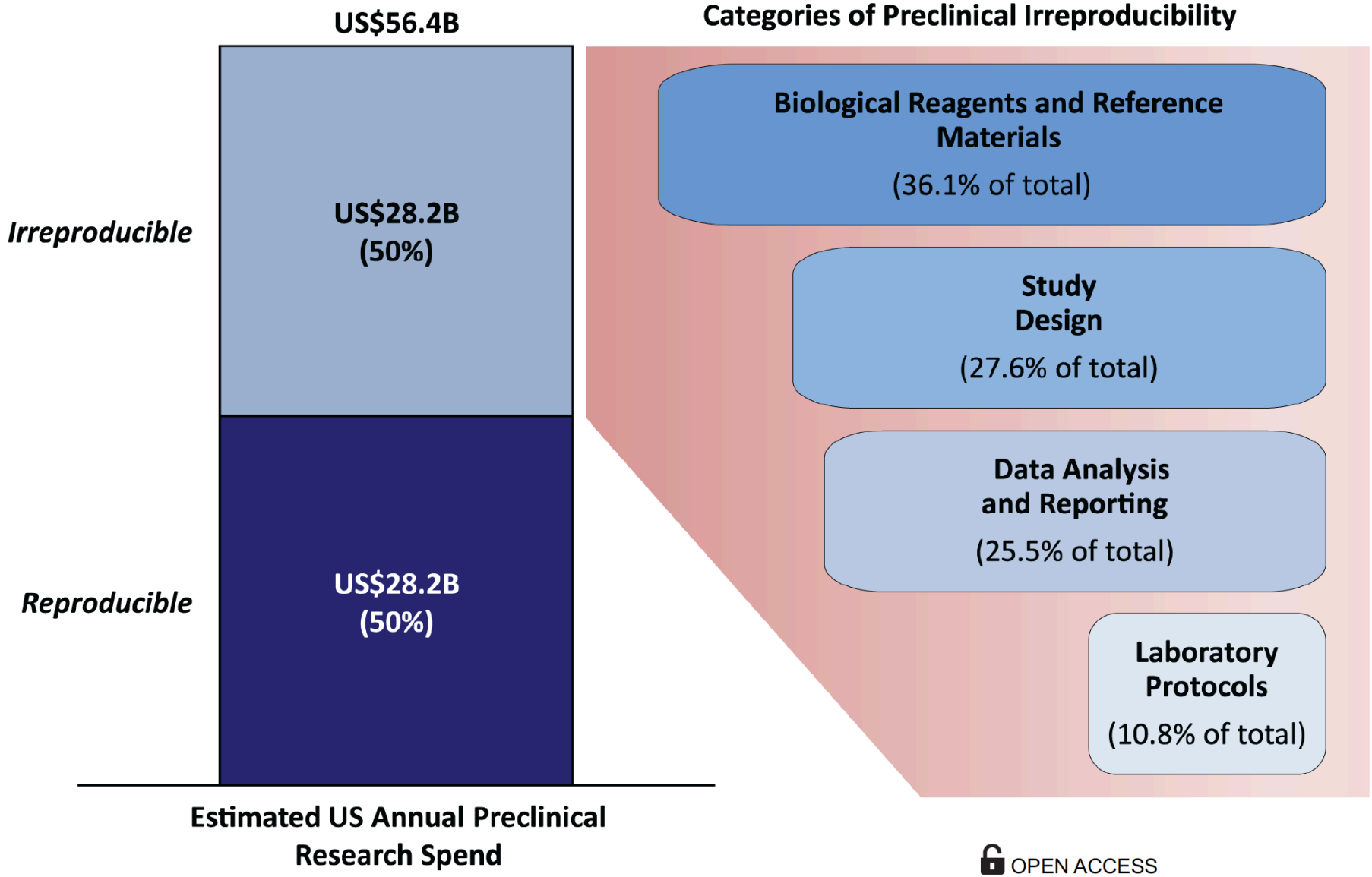
Leonard P. Freedman[1]*, Iain M. Cockburn[2], Timothy S. Simcoe[2,3]

1 Global Biological Standards Institute, Washington, D.C., United States of America, **2** Boston University School of Management, Boston, Massachusetts, United States of America, **3** Council of Economic Advisers, Washington, D.C., United States of America

* lfreedman@gbsi.org

OPEN ACCESS

Citation: Freedman LP, Cockburn IM, Simcoe TS (2015) The Economics of Reproducibility in Preclinical Research. PLoS Biol 13(6): e1002165. doi:10.1371/journal.pbio.1002165



OPEN ACCESS

Citation: Freedman LP, Cockburn IM, Simcoe TS (2015) The Economics of Reproducibility in Preclinical Research. PLoS Biol 13(6): e1002165. doi:10.1371/journal.pbio.1002165

Reproducibility will only come with data liberation

AlQuraishi and Sorger, Science Translational Medicine 10.1126/scitranslmed.aaf0968

the numerical data underlying such figures are rarely, if ever, linked to the paper or made available in any other readily accessible location

It is now essential, in our opinion, that we transition to a system in which biomedical research data are liberated from dead-end formats and deposited in public repositories as a precondition for public funding and scientific publication.

Make data accessible for reanalysis

Pro Cons

Data are locked away in rasterized figures and non text files making reanalysis almost impossible

Deposit in public repositories as a precondition for public funding and scientific publication

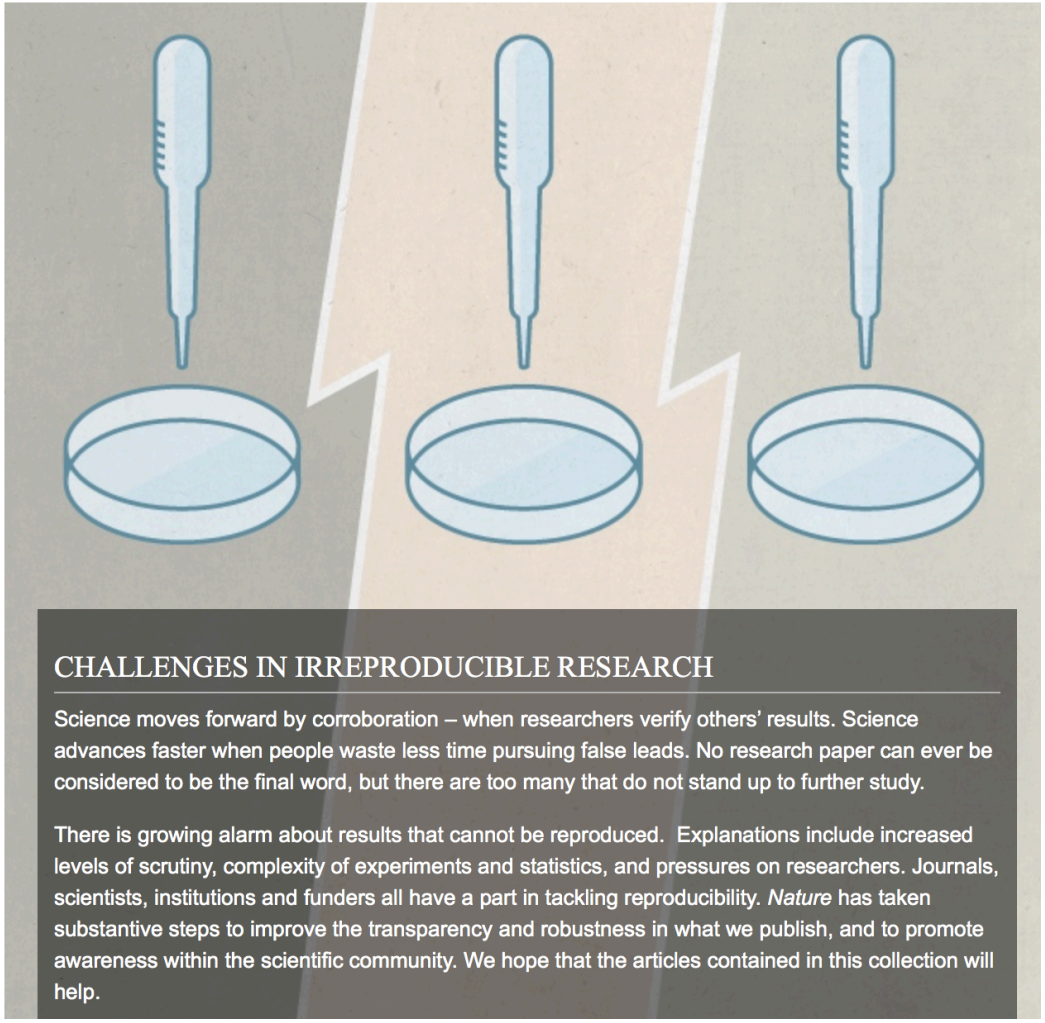
However there is little consensus

Ratio between data generation and data analysis will continue to shift in favor of the latter

Challenges in irreproducible research, Nature special issue 8 October 2015

SPECIAL

See all specials



nature research

Corresponding author(s): Florian Krammer

Last updated by author(s): 2020-4-11

Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Research policies, see Authors & Referees and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed
☐	☒ The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☒	☐ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒ The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☒	☐ A description of all covariates tested
☒	☐ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☒	☐ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒ For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐ Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	No software was used for data collection.
Data analysis	GraphPad Prism 7.05

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors/reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

The data shown in the manuscript is available upon request from the corresponding author.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	Sample size was determined/limited by available number of samples. The maximum number of samples available was analyzed. Positive and negative control samples for assay development showed a clear difference in reactivity that could already be detected with an n of 4 positive samples.
Data exclusions	All data was included in the analysis
Replication	Assays were repeated with 4 different substrates. ELISAs for each substrate were run once each. All attempts at replication were successful.
Randomization	Randomization was not performed since the purpose of this work was assay development.
Blinding	Blinding was not performed since the purpose of this work was assays development. Performance tests of this assay setup in our clinical laboratory have been conducted using blinded operators.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems		Methods	
n/a	Involved in the study	n/a	Involved in the study
☐	☒ Antibodies	☒	☐ ChIP-seq
☐	☒ Eukaryotic cell lines	☒	☐ Flow cytometry
☒	☐ Palaeontology	☒	☐ MRI-based neuroimaging
☒	☐ Animals and other organisms		
☐	☒ Human research participants		
☒	☐ Clinical data		

Antibodies

Antibodies used	mAb CR3022 is a published antibody with known reactivity to the RBD of SARS-CoV-1 and 2. 1C7 is an unpublished in-house mAb with reactivity to the N protein of SARS-CoV-1 and 2.
Validation	Both mAbs were validated by binding studies to cells infected with SARS-CoV-2.

Eukaryotic cell lines

Policy information about cell lines

Cell line source(s)	Sf9, High Five and and Vero.E6 cells were sourced from ATCC. Expi293F cells were sourced from ThermoFisher.
Authentication	No authentication was performed. All expression constructs were Sanger sequenced.
Mycoplasma contamination	The cell lines were not tested for mycoplasma.
Commonly misidentified lines (See ICLAC register)	No commonly misidentified cell lines were used.

Human research participants

Policy information about studies involving human research participants

Population characteristics	Only de-identified samples were used. This is considered non-human subject research. 16 samples were from COVID19 survivors, 109 negative control samples were from a non-COVID19 infected cohort age 20 to 65+.
Recruitment	No participants were enrolled. All samples were preexisting.
Ethics oversight	Alfred Hospital (ID #280/14) and University of Melbourne (ID #1442952.1, 1955465.2) Human Research Ethics Committees, under research permit for project TYH2018322 of Helsinki University Hospital Laboratory and by the IRB of the Icahn School of Medicine at Mount Sinai, NY

http://retractionwatch.com

- A blog devoted to the examination of retracted articles “as a window to the scientific process”
- By journalists Ivan Oransky and Adam Marcus

Science Integrity Digest

A blog about science integrity, by Elisabeth Bik, for Harbers-Bik LLC. Support my work at Patreon.com/elisabethbik

Home About FAQ How-To guides

Retraction Watch

Tracking retractions as

Science retracts paper after Nobel laureate's lab can't replicate results

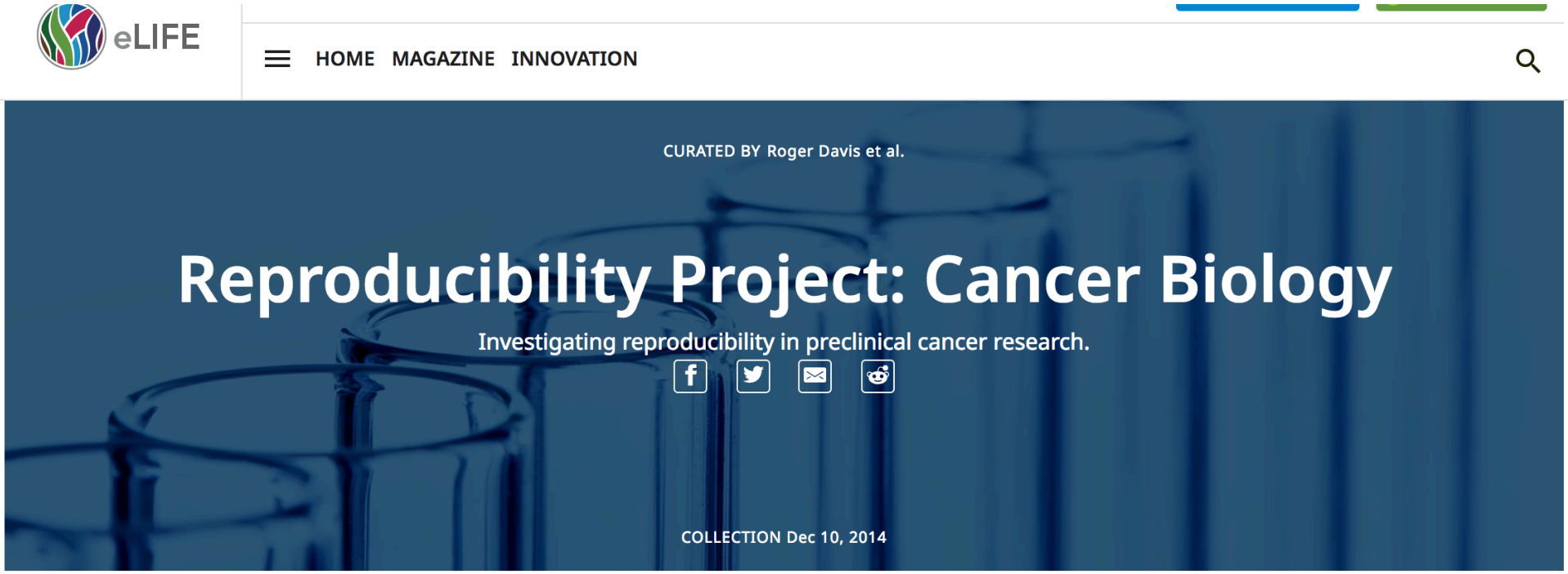
without comments

Science is retracting a 2014 paper from the lab of a Nobel winner after replication attempts failed to conclusively support the original results.

In January, Bruce Beutler, an immunologist at University of Texas Southwestern Medical Center and winner of the 2011 Nobel Prize in Physiology or Medicine, emailed *Science* editor-in-chief Jeremy Berg to report that attempts to replicate the findings in "MAVS, cGAS, and endogenous retroviruses in T-independent B cell responses" had weakened his confidence in original results. The paper had found that virus-like elements in the human genome play an important role in the immune system's response to pathogens.

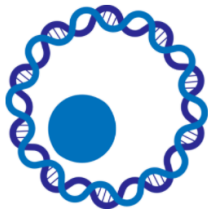
Although Beutler and several co-authors requested retraction right off the bat, the journal discovered that two co-authors disagreed, which Berg told us drew out the retraction process. In an attempt to resolve the situation, the journal waited for Beutler's lab to perform another replication attempt. Those findings were inconclusive and the dissenting authors continued to push back against retraction.

October 26 2017



https://elifesciences.org/collections/9b1e83d1/reproducibility-project-cancer-biology

Reproducibility Project: Cancer Biology (RP:CB) Overview



The Reproducibility Project: Cancer Biology (RP:CB) is an initiative to conduct direct replications of 50 high-impact cancer biology studies. The project anticipates learning more about predictors of reproducibility, common obstacles to conducting replications, and how the current scientific incentive structure affects research practices by estimating the rate of reproducibility in a sample of published cancer biology literature. The RP:CB is a collaborative effort between the Center for Open Science and network provider Science Exchange, and will be published in eLife.

Through independent direct replication studies, the project aims to identify best practices that maximize reproducibility and facilitate an accurate accumulation of knowledge, enabling potentially impactful novel findings to be effectively built upon by the scientific community.

Additionally we expect to learn about:

- The overall rate of reproducibility in a sample of the published cancer biology literature.
- Obstacles that arise in conducting direct replications of original studies.
- The feasibility and practical challenges of getting proper materials, methods, and instrumentation for a replication.
- Predictors of replication success such as the journal in which the original finding was published, the citation impact of the original report, the number of direct replications that have been published elsewhere, the transparency of materials and methods included with the publication, and adherence to publishing checklists and guidelines.

Science EXCHANGE

eLIFE

CENTER FOR OPEN SCIENCE

Whereas some researchers laud the effort, others have worried that contract labs lack the expertise to perform certain experiments as well as cutting-edge academic research labs and that any failures will unfairly tarnish the field.

CANCER BIOLOGY

Reproducibility project yields muddy results

An ambitious effort to replicate cancer studies is provoking controversy.

Nature, January 19 2017

launched in 2013, an ambitious effort to scrutinize key findings in 50 (29) cancer papers published in *Nature*, *Science*, *Cell* and other high-impact journals.

First report in eLife, January 19 on 5 papers:
1 failed to replicate
2 substantially reproduced, although not all experiments reached statistical significance
2 un-interpretable results

Cancer studies pass reproducibility test

By Jocelyn Kaiser | Jun. 27, 2017 Science

Two more studies replicated in eLife in June 2017

1) Original report form C Thompson's lab, Cancer Cell 2010 (fully reproduced)
2) Original report 2011 Nature (the in vivo data did not show any effect of the inhibitor, but lower dose was used)

Replication Study: The common feature of leukemia-associated IDH1 and IDH2 mutations is a neomorphic enzyme activity converting alpha-ketoglutarate to 2-hydroxyglutarate

Replication Study: Inhibition of BET recruitment to chromatin as an effective treatment for MLL-fusion leukaemia

SCIENTIFIC AMERICAN®

Observations | *Opinion*

We're Incentivizing Bad Science

Current research trends resemble the early 21st century's financial bubble

By James Zimring on October 29, 2019

So, let's imagine what might happen if the rules of professional science evolved such that scientists were incentivized to publish as many papers as they could and if those who published many papers of poor scientific rigor were rewarded over those who published fewer papers of higher rigor? What would happen if scientists weren't rewarded for the long-term reproducibility and rigor of their findings, but rather became a factory that produced and published highly exciting and innovative new discoveries, and then other scientists and companies spent resources on the follow up studies and took all the risk?

This is not an issue of scientific fraud or misconduct where scientists invent data or purposefully lie; the data are real and were really observed. However, the fiercely competitive environment leads to a haste to publish and a larger number of less rigorous papers results. Careful and self-critical scientists who spend more time and resources to carry out more rigorous and careful studies may be promoted less often, receive fewer research resources and get less recognition for their work.

However, open access journals charge the authors of articles a substantial fee to publish, in order to make up for the dollars lost from not requiring subscriptions. So, instead of making more money the more copies of the journal they sell, open access journals make more money as a function of how many articles they accept. Authors are willing to pay more to get their articles published in more prestigious journals. So, the more exciting the findings a journal publishes, the more references, the higher the impact the journal, the more submissions they get, the more money they make.

Two papers relying on hospital records of COVID-19 patients have been retracted because the company that purportedly analyzed the raw data won't allow their validity to be independently validated. AP PHOTO/MANU FERNANDEZ

Two elite medical journals retract coronavirus papers over data integrity questions

By **Charles Piller, Kelly Servick** | Jun. 4, 2020 , 5:30 PM

NEJM, ACE inhibitors and risk of COVID
The Lancet, chloroquine study (serious harm, no help)
Preprint*, ivermectin*, then bought by American Latin countries

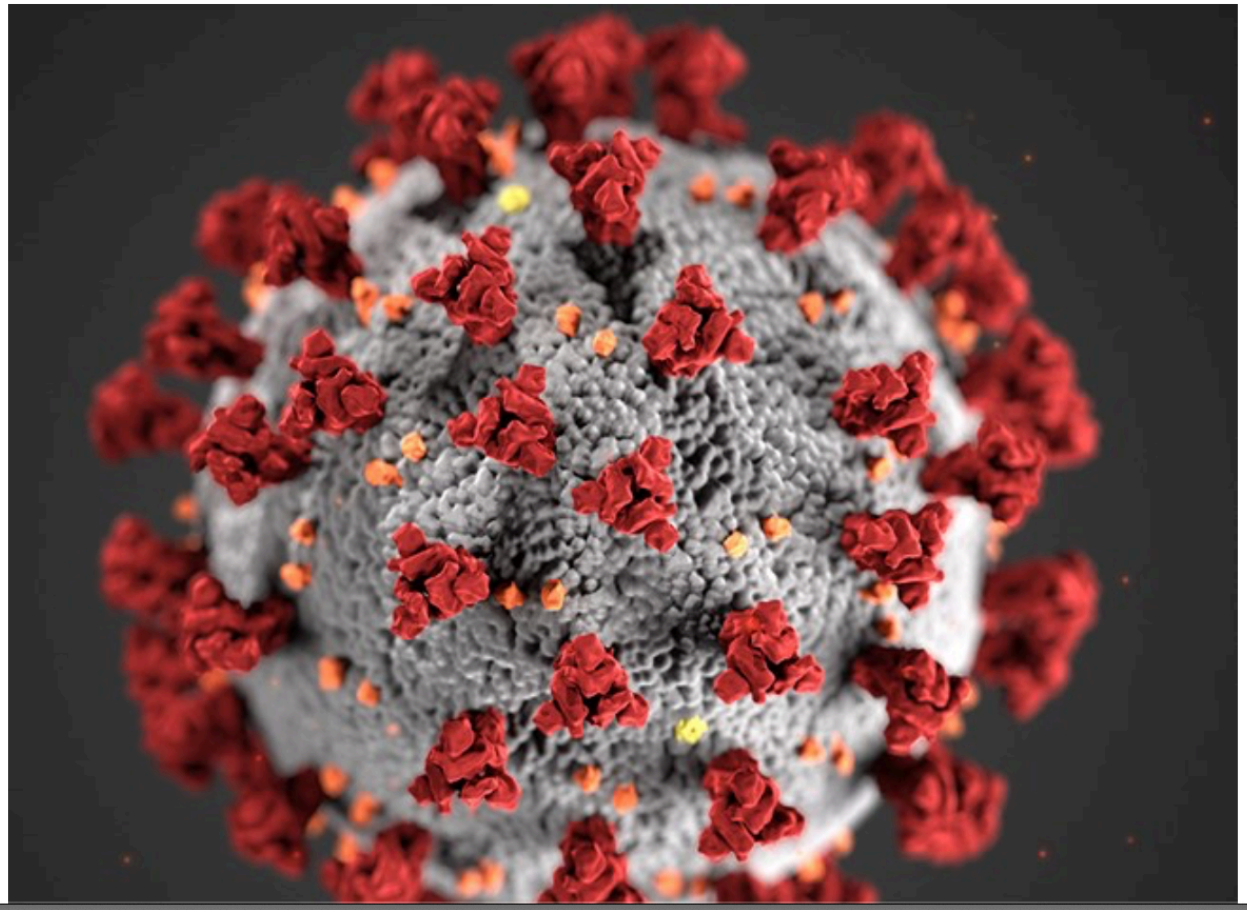
Surgisphere, the company behind the data collection, refused to make the data available for scrutiny

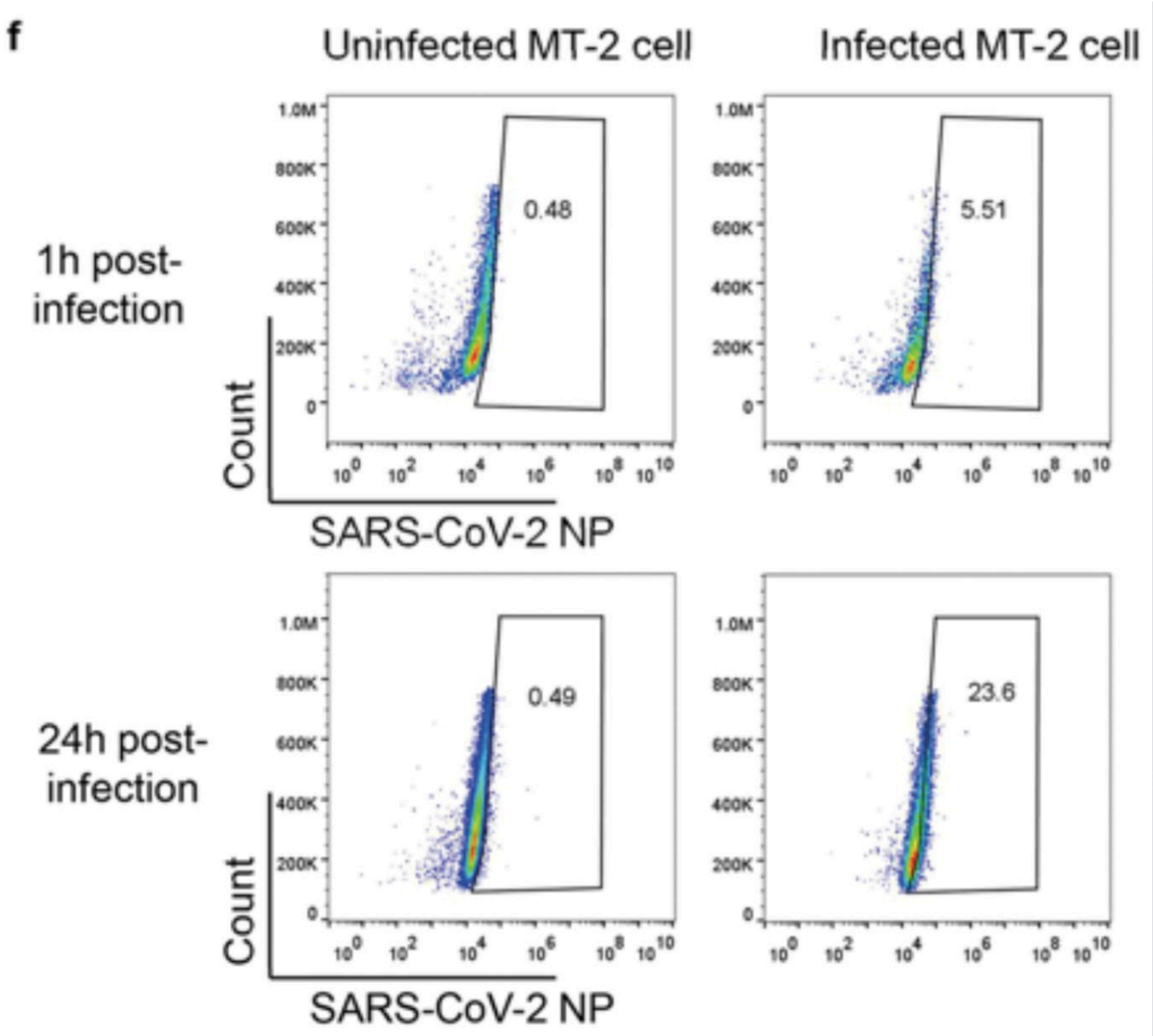
Meanwhile, the WHO and others halted international trials
(later resumed)

Mehra conceded that in the rush to publish during the COVID-19 crisis, “I did not do enough to ensure that the data source was appropriate for this use. For that, and for all the disruptions—both directly and indirectly—I am truly sorry.”

..by publishing only the author retraction statements, *The Lancet* and *NEJM* “didn’t show any self-reflection, any introspection. They should have looked at what might have gone wrong” in their own editorial process.

A journal took three days to accept a COVID-19 paper. It's taken two months and counting to retract it.




f
Uninfected MT-2 cell
Infected MT-2 cell
1h post-infection
24h post-infection
Count
SARS-CoV-2 NP
0.48
5.51
0.49
23.6
1.0M
800K
600K
400K
200K
0
10^0
10^2
10^4
10^6
10^8
10^{10}

Malpractice

We hope this never happens but ……

What do you do if you become aware of malpractice in the lab?

Nobody likes being a whistleblower

Who should you tell – lab-mates, supervisor, head of department, your college advisor?

Consequences of being part of a false publication are bad

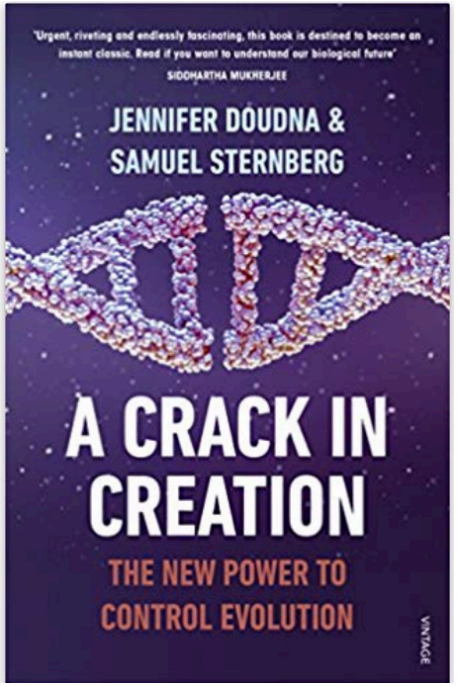
Retraction can ameliorate damage

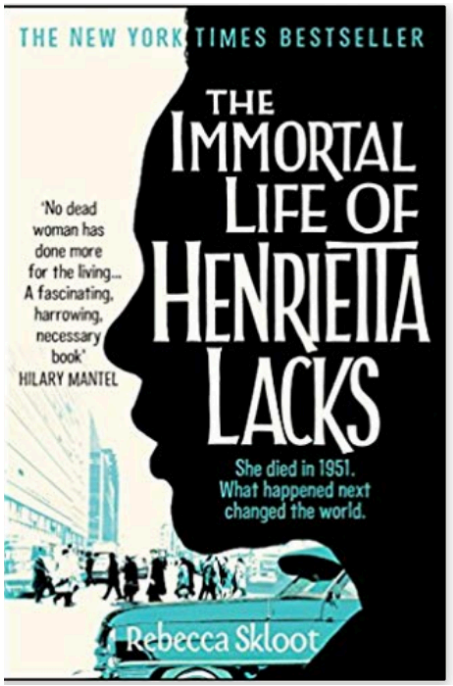
How can you help?

Read the literature carefully
Discuss with peers
Raise your questions in lab meetings
Raise your queries with your supervisors
Check the raw data of papers you are listed as co-authors (or make sure they have been double checked)

Further readings

Research ethics





NEWS · 29 OCTOBER 2020 · CORRECTION 30 OCTOBER 2020

Wealthy funder pays reparations for use of HeLa cells

Howard Hughes Medical Institute's six-figure donation is a step towards addressing racial injustice in the sciences.

Alexandra Witze

EDITORIAL · 01 SEPTEMBER 2020

Henrietta Lacks: science must right a historical wrong

In Henrietta Lacks's centennial year, researchers must do more to ensure that human cells cannot be taken without consent.

Role play – case studies

Informed consent for use of stored specimen

Authorship

Roger's data