

The Declaration on Research Assessment (DORA): Opening up the measures of success



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Improving how research is assessed

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Stephen Curry

Imperial College

Workshop on Open Citations | Bologna | 04 Sept 2018

The problem with citations...

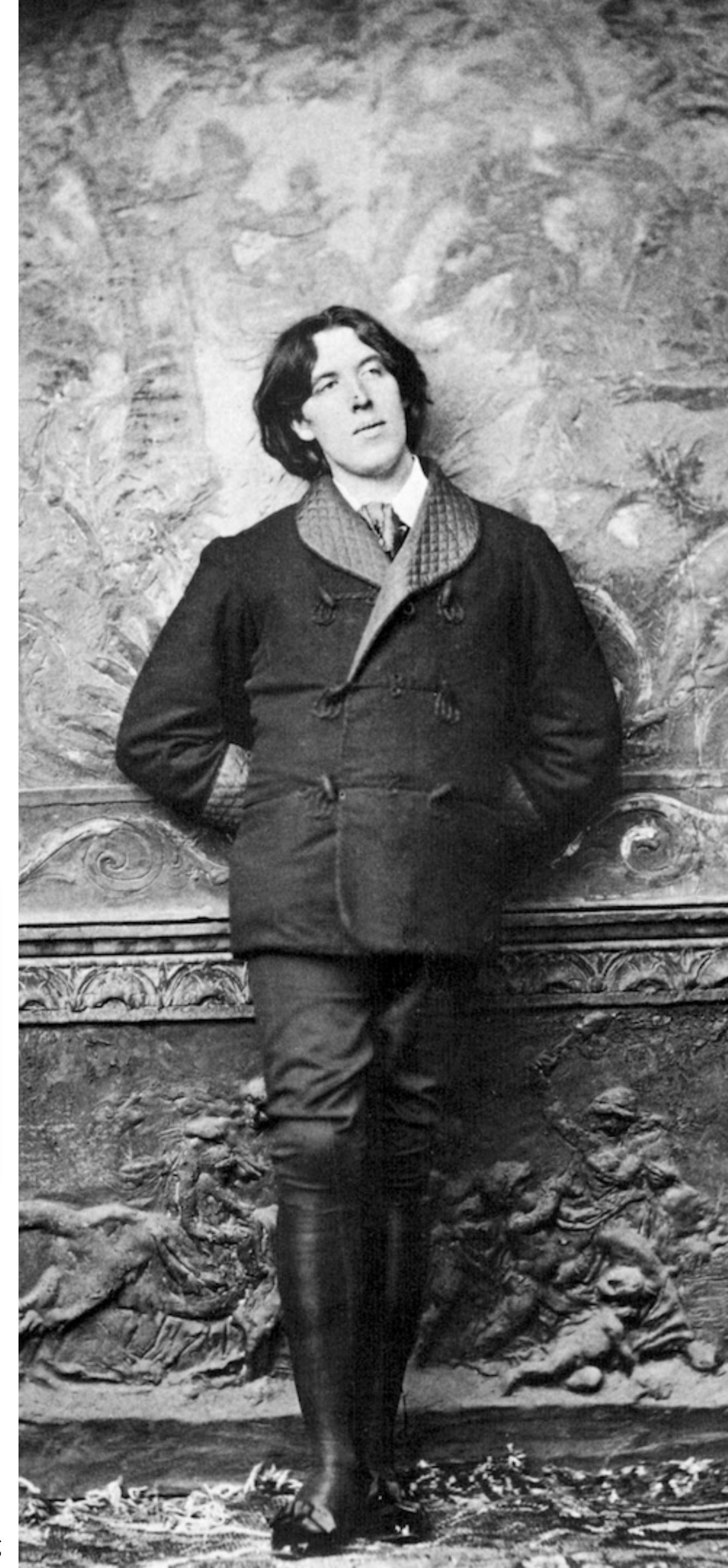


The problem with citations...



"There is only one thing in the world worse than being talked about, and that is not being talked about."

Oscar Wilde



What do citations mean?

RESEARCH ARTICLE

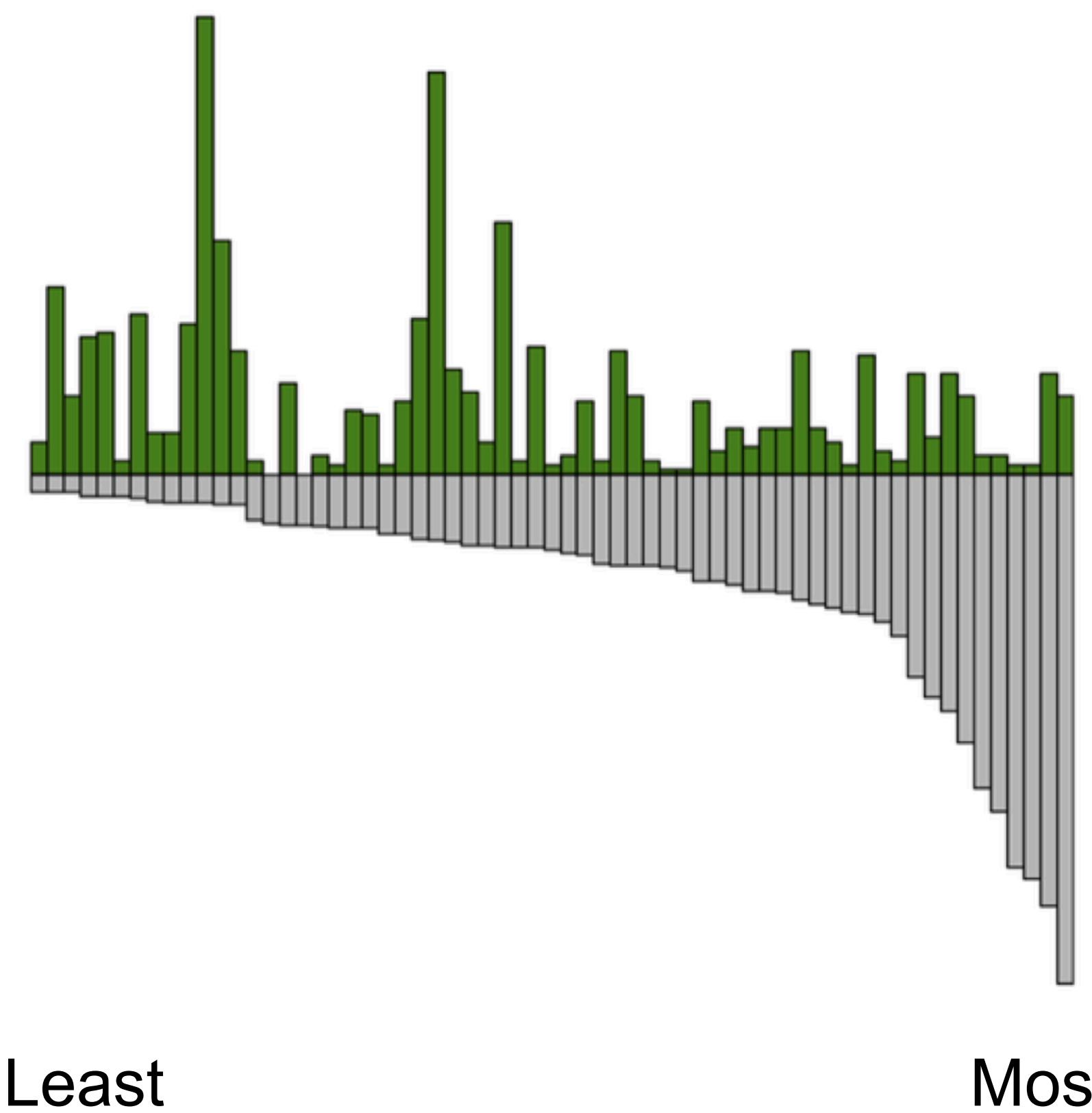
Perception of the importance of chemistry research papers and comparison to citation rates

Rachel Borchardt^{1*}, Cullen Moran¹, Stuart Cantrill², Chemjobber³, See Arr Oh⁴, Matthew R. Hartings^{1*}

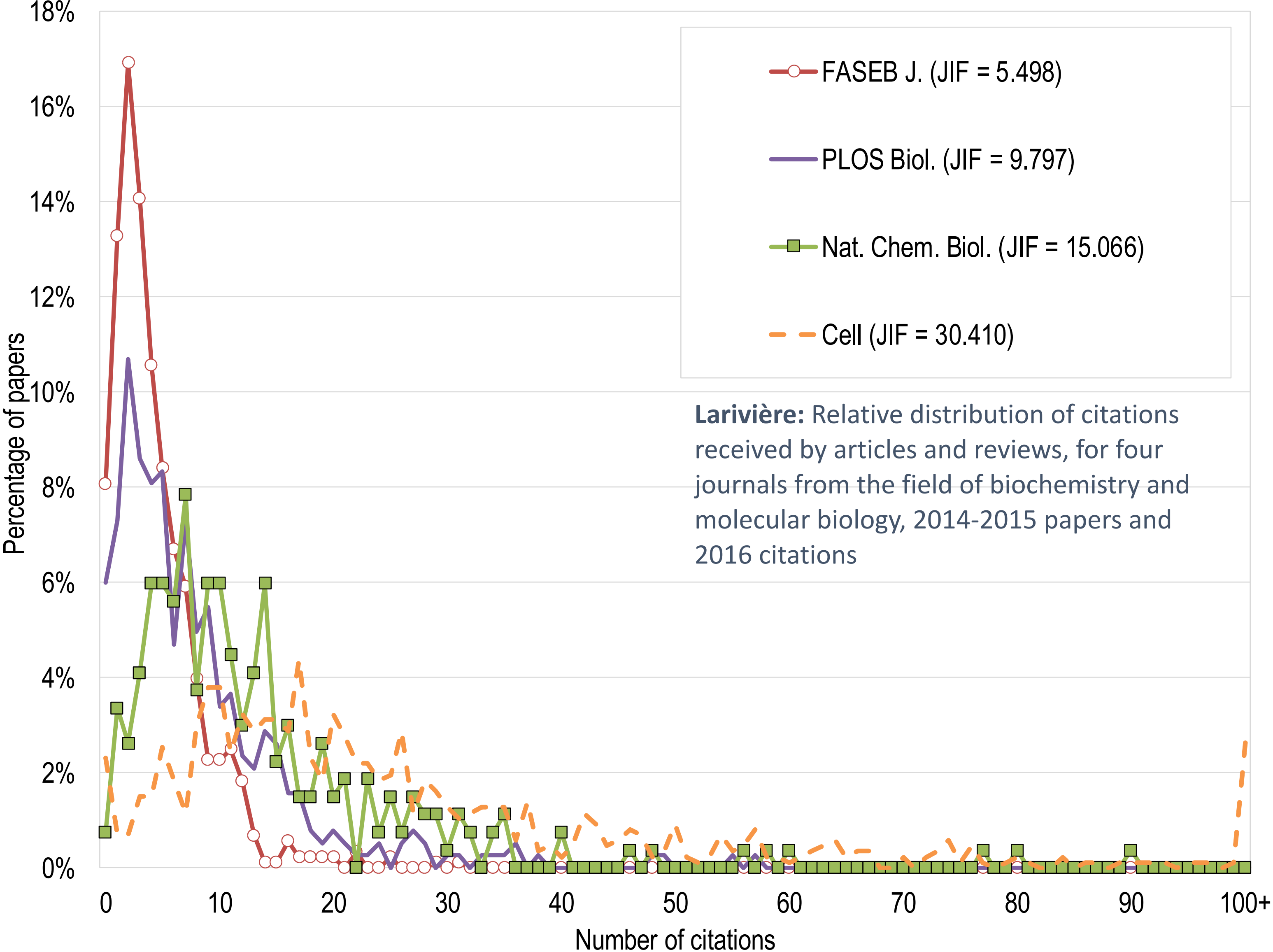
¹ American University, NW, Washington, DC, United States of America, ² Nature Chemistry, SpringerNature, London, United Kingdom, ³ Chemjobber, Shell, WV, United States of America, ⁴ Just Like Cooking, Krypton, KY, United States of America

several observations. The ability of respondents to predict the citation counts of established research is markedly lower than the ability of those counts to be predicted by the h-index of the corresponding author of each article. This observation is conserved even when only considering responses from chemists whose expertise falls within the subdiscipline that best describes the work performed in an article. Respondents view both cited papers and significant papers differently than papers that should be shared with chemists. We conclude from our results that peer judgements of importance and significance differ from metrics-based measurements, and that chemists should work with bibliometricians to develop metrics that better capture the nuance of opinions on the importance of a given piece of research.

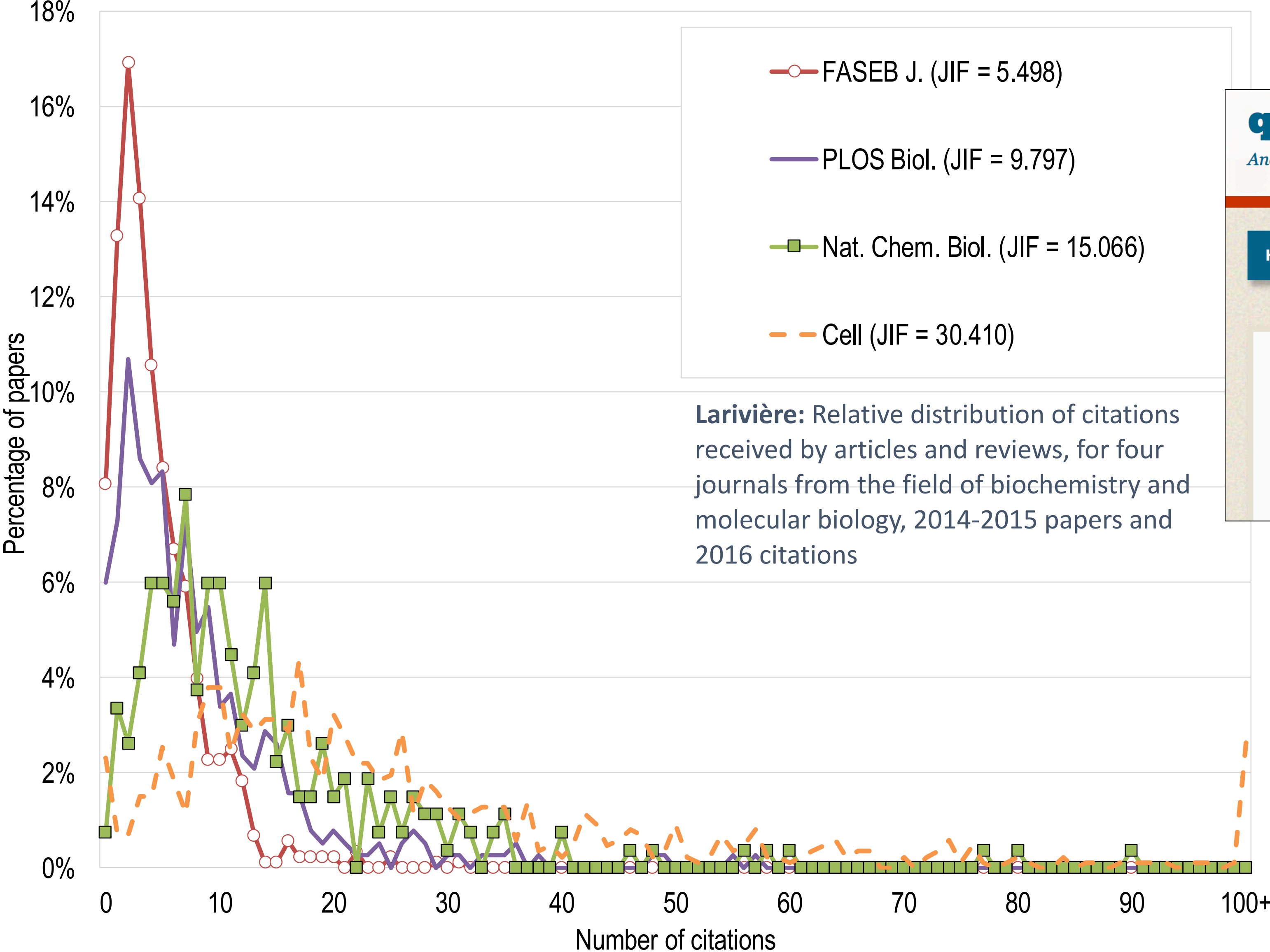
Times Chosen in Survey
(Most Significant)



Citation distributions: the importance of seeing the whole picture



Citation distributions: the importance of seeing the whole picture



Larivière: Relative distribution of citations received by articles and reviews, for four journals from the field of biochemistry and molecular biology, 2014-2015 papers and 2016 citations

quantixed
Analysis, more words, extra content

<https://quantixed.wordpress.com/2015/05/05/wrong-number-a-closer-look-at-impact-factors/>

Home mechanochemistry.org github Royle Lab About

Wrong Number: A closer look at Impact Factors


By [quantixed](#) on May 5, 2015

This is a long post about Journal Impact Factors. Thanks to Stephen Curry for encouraging me to post this.

- JIF based on highly skewed data
- JIF is a poor predictor of the number of citations of any given paper
- Reporting JIF to 3 d.p. is ridiculous; better to round to nearest 5 or 10

Citation distributions: the importance of seeing the whole picture

PNAS



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New Results

A simple proposal for the publication of journal citation distributions

iD Vincent Lariviere, iD Veronique Kiermer, iD Catriona J MacCallum, iD Marcia McNutt, iD Mark Patterson, iD Bernd Pulverer, iD Sowmya Swaminathan, iD Stuart Taylor, iD Stephen Curry

doi: <http://dx.doi.org/10.1101/062109>

This article is a preprint and has not been peer-reviewed [what does this mean?].

Abstract

Info/History

Metrics

Supplementary material

PDF Preview PDF

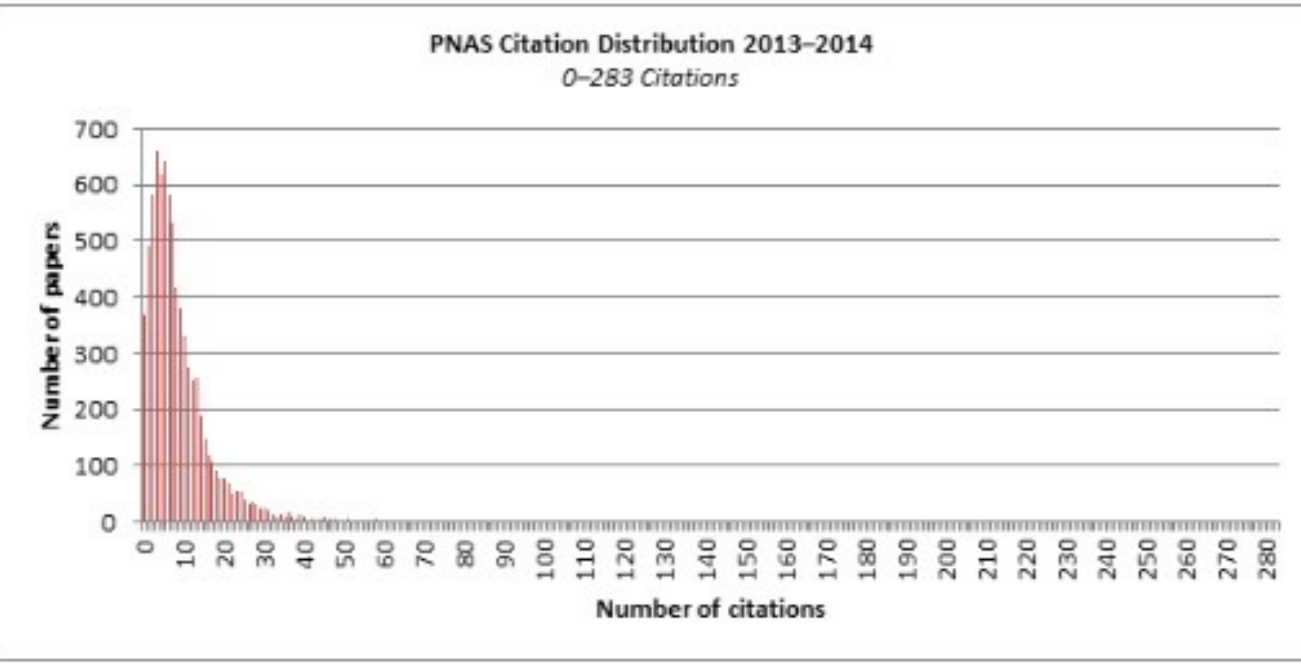
Abstract

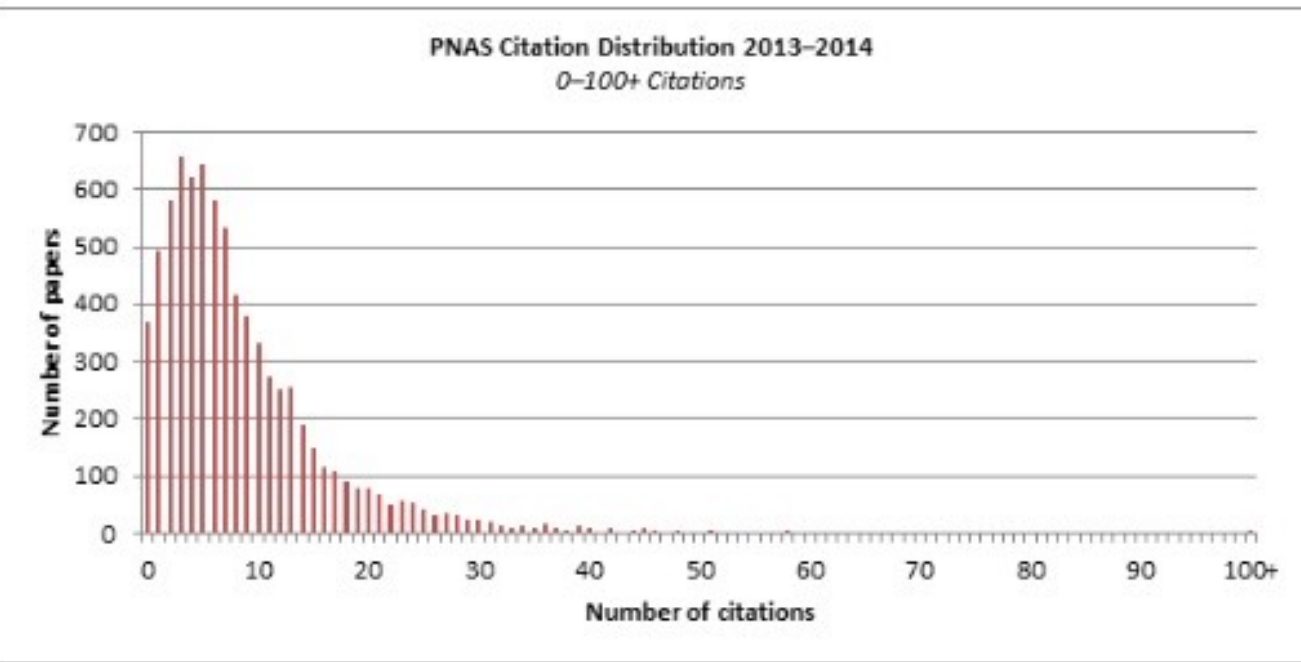
Although the Journal Impact Factor (JIF) is widely acknowledged to be a poor indicator of the quality of individual papers, it is used routinely to evaluate research and researchers. Here, we present a simple method for generating the citation distributions that underlie JIFs. Application of this straightforward protocol reveals the full extent of the skew of these distributions and the variation in citations received by published papers that is characteristic of all scientific journals. Although there are differences among journals across the spectrum of JIFs, the citation distributions overlap extensively, demonstrating that the citation performance of individual papers cannot be inferred from the JIF. We propose that this methodology be adopted by all journals as a move to greater transparency, one that should help to refocus attention on individual pieces of work and counter the inappropriate usage of JIFs during the process of research assessment.

Impact factor: a measure of the frequency with which the "average article" in a journal has been cited in a particular year or period. The journal impact factor is calculated by dividing the number of current year citations to source items published in that journal during the previous 2 years.

Immediacy index: the average number of times an article is cited in the year it is published.

Cited half-life: the number of years, going back from the current *Journal Citation Reports* (JCR) year, that account for 50% of citations received by the journal in the current JCR year.





Citation distribution: the distribution of citations to articles over the previous 2 years that contributes to the current JCR year's impact factor.

See "A simple proposal for the publication of journal citation distributions," by Vincent Lariviere, Veronique Kiermer, Catriona J MacCallum, Marcia McNutt, Mark Patterson, Bernd Pulverer, Sowmya Swaminathan, Stuart Taylor, and Stephen Curry. BioRxiv. Posted July 5, 2016. <http://dx.doi.org/10.1101/062109>.

- Citation Distributions**
- Royal Society Journals
 - EMBO Journal
 - PLOS
 - PNAS
 - Nature
 - Nature Communications
 - Nature Chemistry
 - Scientific Reports
 - Acta Cryst. (A-F)

- No promotion of JIFs**
- PLOS
 - eLife
 - ASM journals

From 2018:
Distributions available via WoS
Subscribers can share the graphic...

Can we make them fully open?

The problem with the h-index...



Stephen Curry

FOLLOW

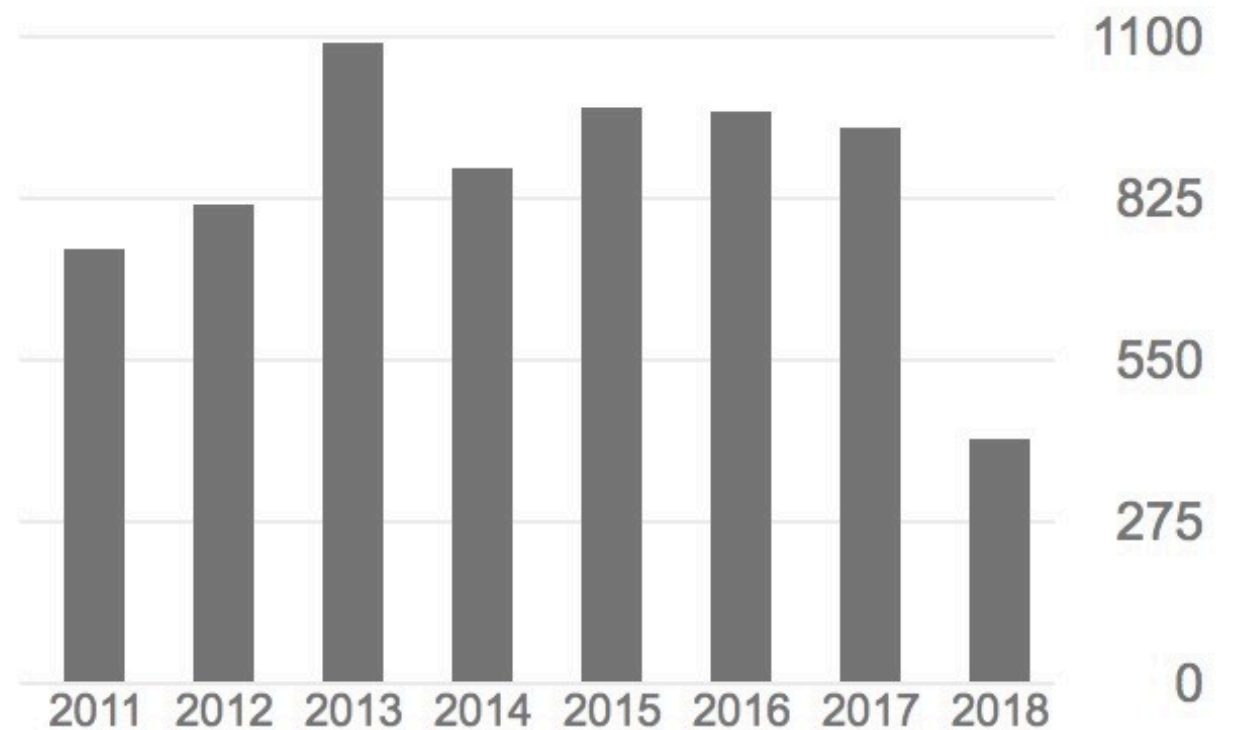
Professor of Structural Biology, [Imperial College](#)
 Verified email at imperial.ac.uk - [Homepage](#)

[protein structure](#) [virology](#) [human serum albumin](#) [fmdv](#) [splicing](#)

Cited by

[VIEW ALL](#)

	All	Since 2013
Citations	11412	5289
h-index	48	33
i10-index	81	67



<input type="checkbox"/>	TITLE	CITED BY	YEAR
<input type="checkbox"/>	Crystal structure of human serum albumin complexed with fatty acid reveals an asymmetric distribution of binding sites S Curry, H Mandelkow, P Brick, N Franks Nature Structural and Molecular Biology 5 (9), 827	1153	1998
<input type="checkbox"/>	Structural basis of the drug-binding specificity of human serum albumin J Ghuman, PA Zunszain, I Petitpas, AA Bhattacharya, M Otagiri, S Curry Journal of molecular biology 353 (1), 38-52	1149	2005
<input type="checkbox"/>	Crystallographic analysis reveals common modes of binding of medium and long-chain fatty acids to human serum albumin1 AA Bhattacharya, T Grüne, S Curry Journal of molecular biology 303 (5), 721-732	678	2000
<input type="checkbox"/>	Crystal structure analysis of warfarin binding to human serum albumin anatomy of drug site I I Petitpas, AA Bhattacharya, S Twine, M East, S Curry Journal of Biological Chemistry 276 (25), 22804-22809	639	2001
<input type="checkbox"/>	The extraordinary ligand binding properties of human serum albumin M Fasano, S Curry, E Terreno, M Galliano, G Fanali, P Narciso, S Notari, ... IUBMB life 57 (12), 787-796	604	2005

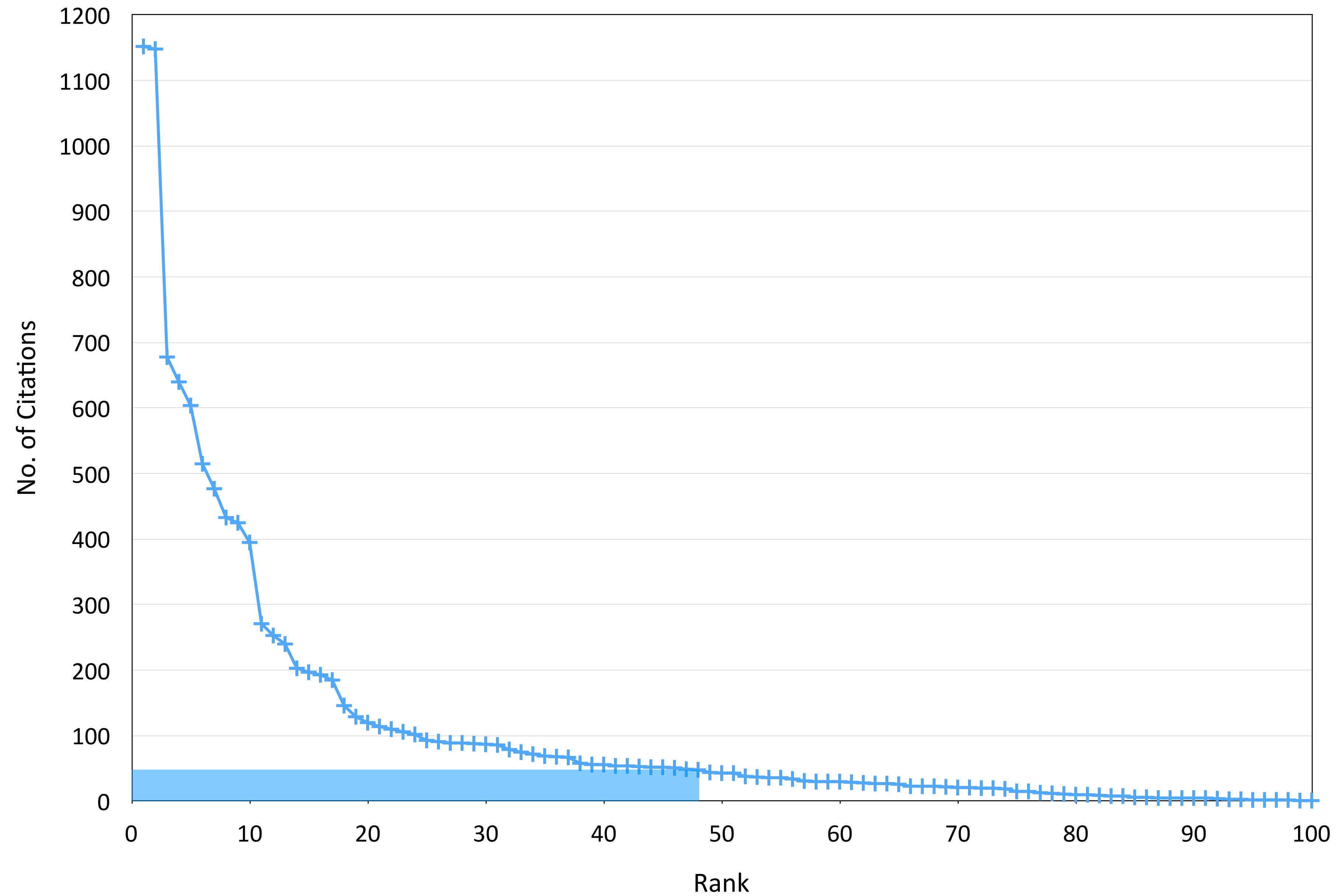
Co-authors

[EDIT](#)

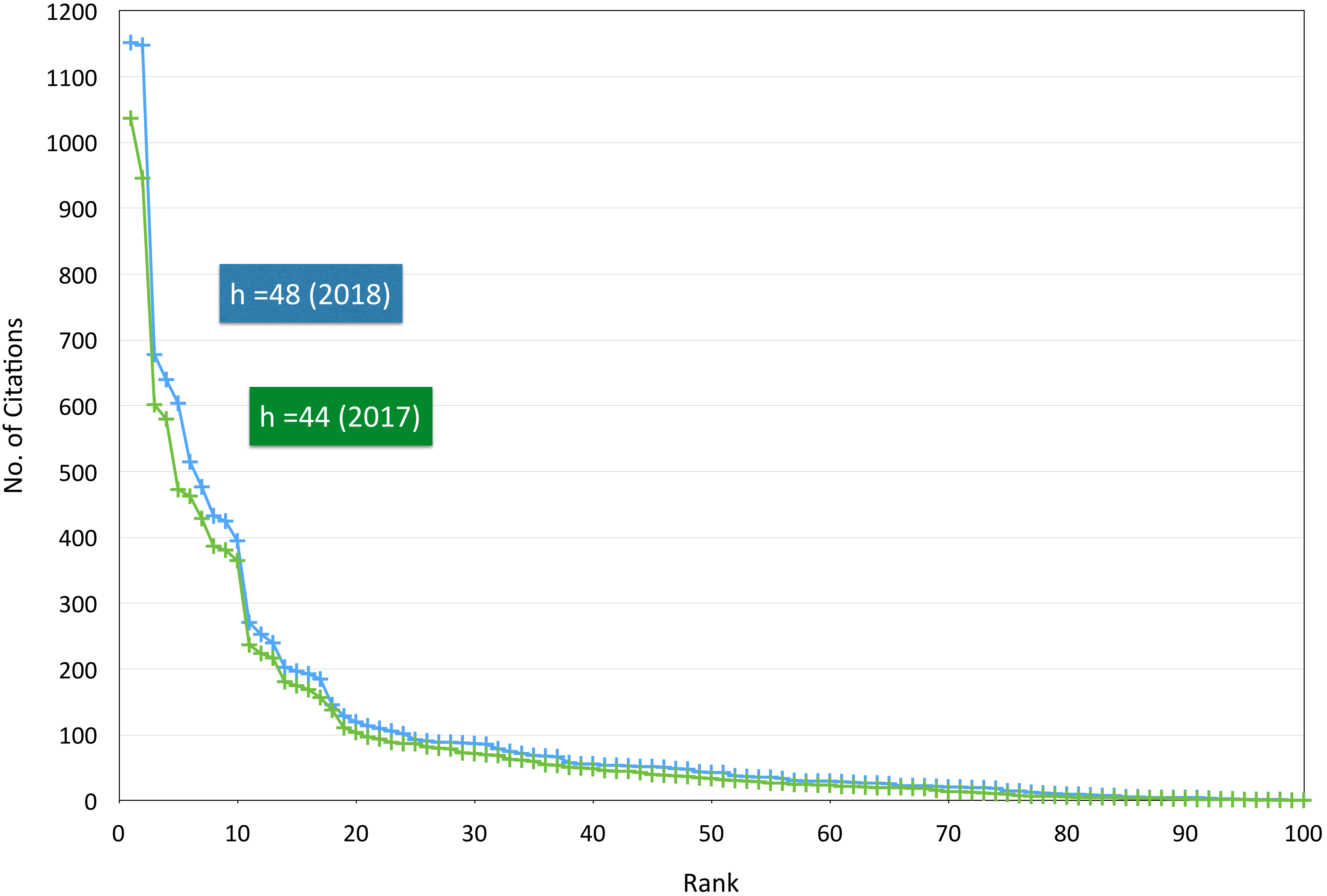


Ian Goodfellow
University of Cambridge

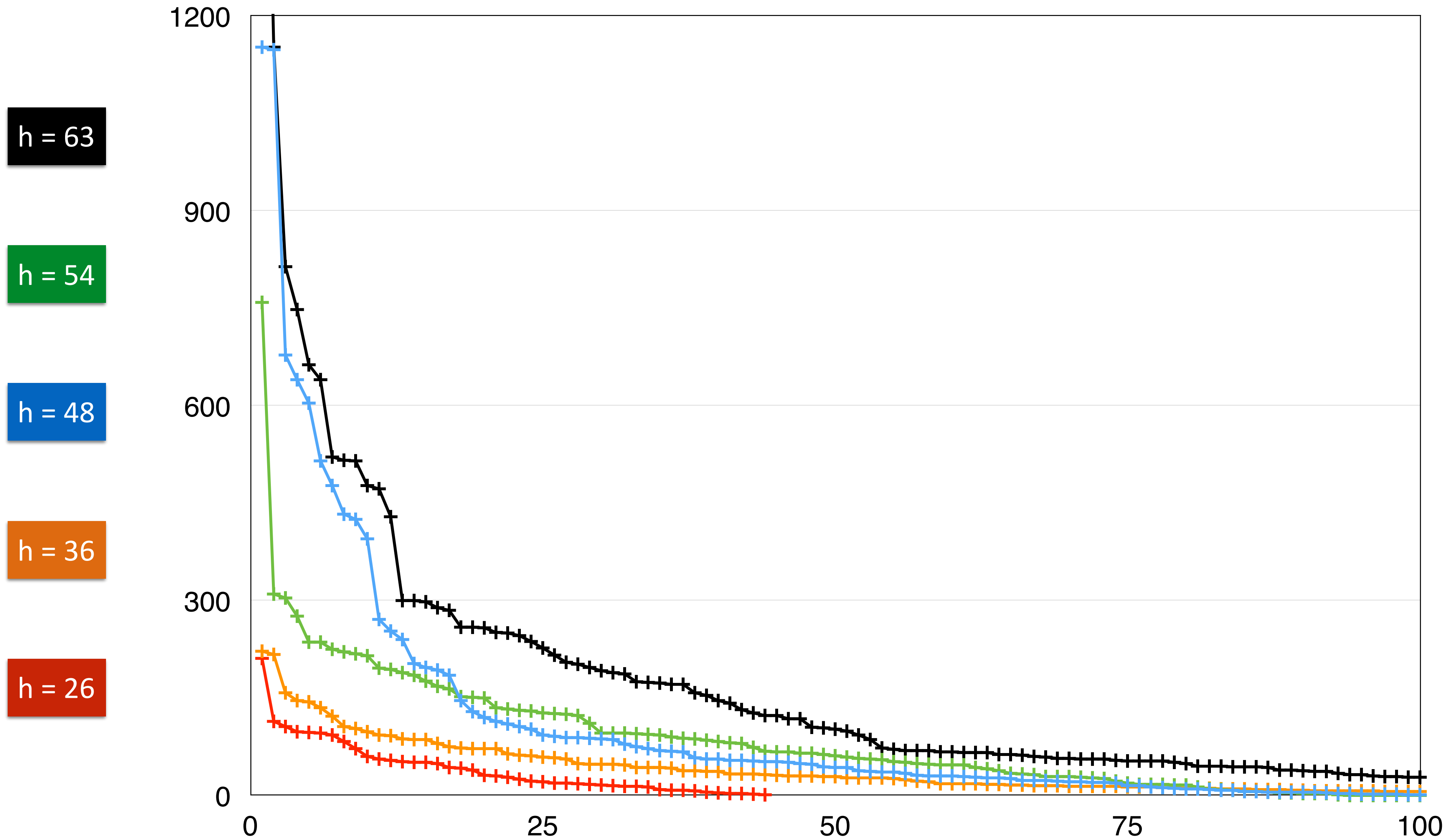
The h-index distribution: what does a h-index of 48 mean?



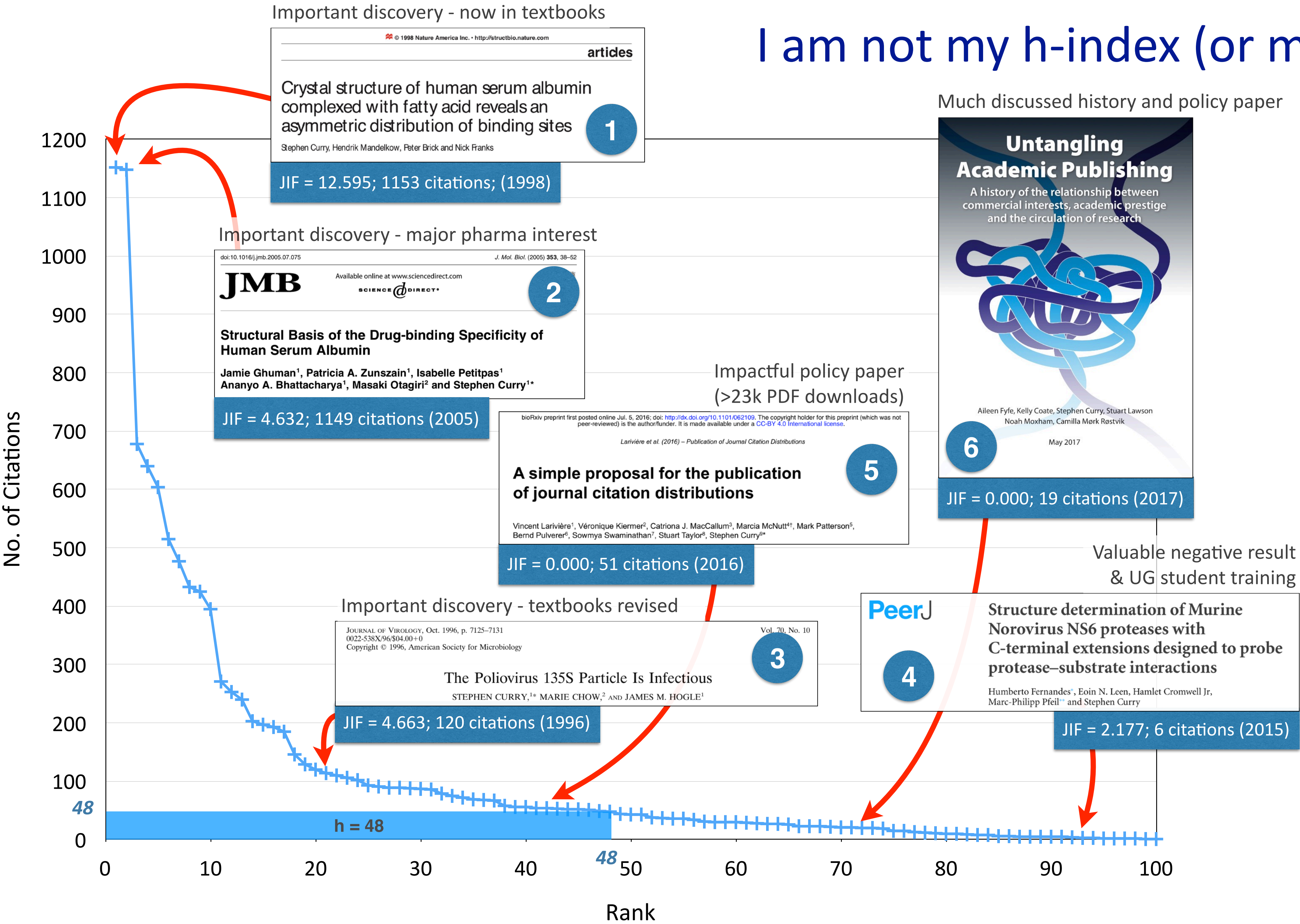
Did I get 10% better at science between 2017 and 2018?



Can I meaningfully compare my h-index compared to my colleagues?



I am not my h-index (or my JIFs)



Focusing researcher assessment on academic outputs is problematic

My Word

The mismeasurement of science

Peter A. Lawrence

Answer from the hero in Leo Szilard's 1948 story "The Mark Gable Foundation" when asked by a wealthy entrepreneur who believes that science has progressed too quickly, what he should do to retard this progress: "You could set up a foundation

release. The song writers would soon find that producing junky Christmas tunes and cosying up to DJs from top radio stations advanced their careers more than composing proper music. It is not so funny that, in the real world of science, dodgy evaluation criteria such as impact factors and citations are dominating minds, distorting behaviour and determining careers.

Modern science, particularly biomedicine, is being damaged by attempts to measure the quantity and quality of research. Scientists are ranked according to these measures, a ranking that impacts on funding of grants, competition for posts and

<http://dx.doi.org/10.1016/j.cub.2007.06.014>

Sick of Impact Factors

Posted on August 13, 2012 by Stephen

I am sick of impact factors and so is science.

The impact factor might have started out as a good idea, but its time has come and gone. [Conceived by Eugene Garfield](#) in the 1970s as a useful tool for research libraries to judge the relative merits of journals when allocating their subscription budgets, the impact factor is [calculated](#) annually as the mean number of citations to articles published in any given journal in the two preceding years.



<http://occamstypewriter.org/scurry/2012/08/13/sick-of-impact-factors/>

THE CULTURE OF SCIENTIFIC RESEARCH IN THE UK

- In some cases the culture of scientific research does not support or encourage scientists' goals and the activities that they believe to be important for the production of high quality science.
- There seem to be widespread misperceptions or mistrust among scientists about the policies of those responsible for the assessment of research.

<http://nuffieldbioethics.org/project/research-culture/>

OPEN ACCESS Freely available online

PLOS MEDICINE

Essay

How to Make More Published Research True

John P. A. Ioannidis^{1,2,3,4*}

<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001747>

Focusing researcher assessment on academic outputs is problematic

Setting the Agenda: 'Who are we answering to'?

Posted on [January 24, 2018](#) by [Kaitlyn Hair](#)

By [Frank Miedema, PhD @MiedemaF](#)

It is now widely acknowledged that we have a serious reproducibility crisis in biomedical and the social sciences at least. Despite the personal ideals and good intentions, in this incentive and reward system researchers find themselves pursuing not the work that benefits public or preventive health or patient care the most, but work that gives most academic credit and is better for career advancement.

The tricky balance between academic freedom and academic responsibility



Saving Science

Science isn't self-correcting, it's self-destructing. To save the enterprise, scientists must come out of the lab and into the real world.

Daniel Sarewitz

The story of how things got to this state is difficult to unravel, in no small part because the scientific enterprise is so well-defended by walls of hype, myth, and denial. But much of the problem can be traced back to a bald-faced but beautiful lie upon which rests the political and cultural power of science. This lie received its most compelling articulation just as America was about to embark on an extended period of extraordinary scientific, technological, and economic growth. It goes like this:

Scientific progress on a broad front results from the free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity for exploration of the unknown.



University of Bologna

Academic responsibility: in tune with ideals and political realities

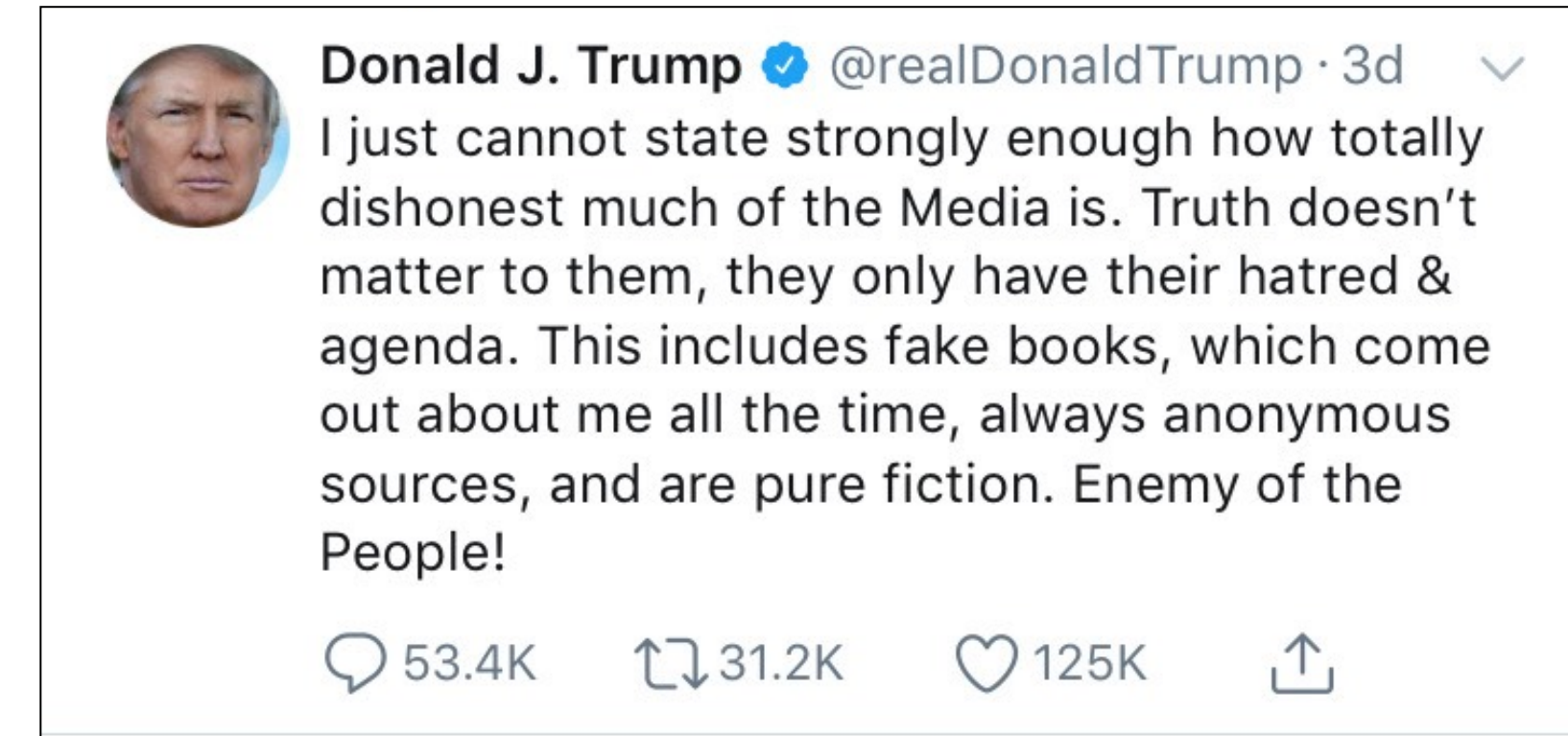
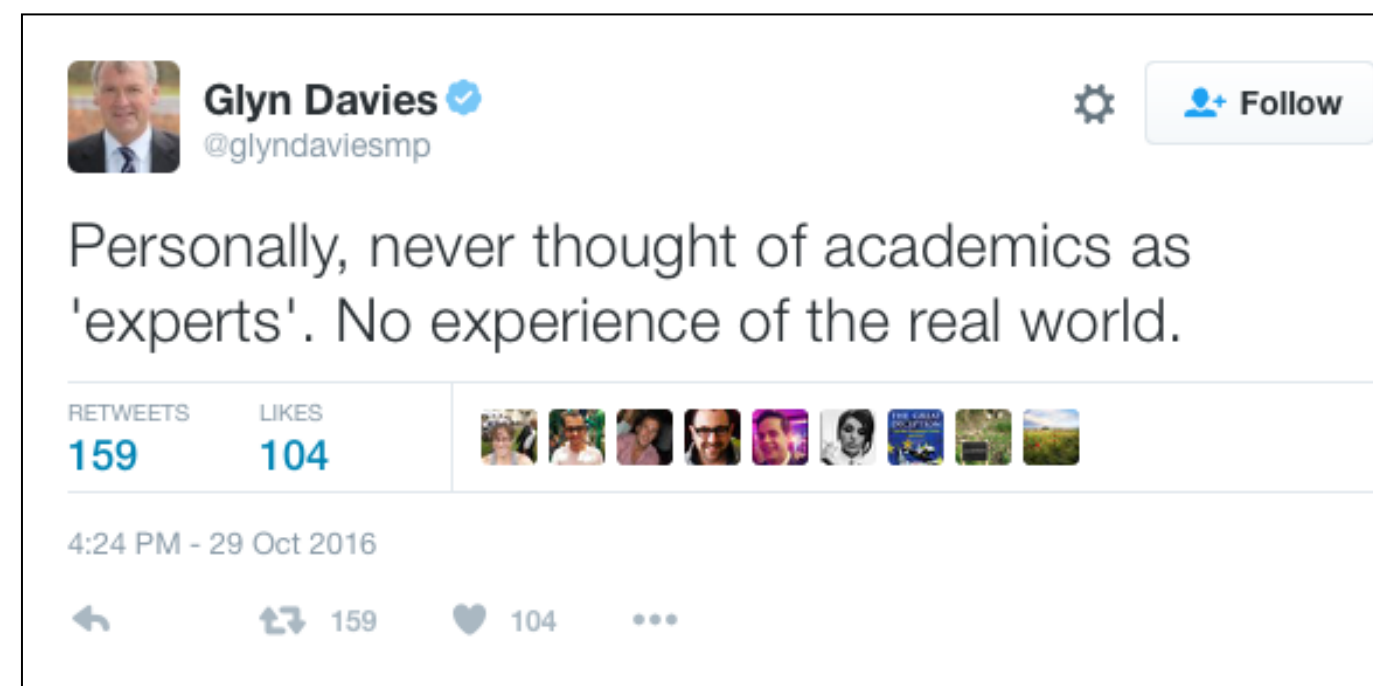


Wikimedia Commons (Dona Eidam/USGS)



“People in this country have had enough of experts.”

Michael Gove, MP



Academic responsibility, open science & the EU



EXECUTIVE SUMMARY

Open Science represents an approach to research that is collaborative, transparent and accessible¹. There are a wide range of activities that come under the umbrella of Open Science that include open access publishing, open data, open peer review and open research. It also includes citizen science, or more broadly, stakeholder engagement, where non specialists engage directly in research. Open Science goes hand in hand with research integrity and requires legal and ethical awareness on the part of researchers. A driver for Open Science is improving the transparency and validity of research as well as in regards to public ownership of science, particularly that which is publicly funded.

Evaluation of Research Careers fully acknowledging Open Science Practices

Rewards, incentives and/or recognition for researchers practicing Open Science

2017

Academic responsibility, open science & the EU



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2017

Publication paywalls are withholding a substantial amount of research results from a large fraction of the scientific community and from society as a whole. This constitutes an absolute anomaly, which hinders the scientific enterprise in its very foundations and hampers its uptake by society. Monetising the access to new and existing research results is profoundly at odds with the ethos of science. There is no longer any justification for this state of affairs to prevail and the subscription-based model of scientific publishing, including its so-called 'hybrid' variants, should therefore be terminated. In the 21st century, science publishers should provide a service to help researchers disseminate their results. They may be paid fair value for the services they are providing, but **no science should be locked behind paywalls!**

Plan S (Announced today)

Academic responsibility, open science & the EU



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Plan S (Announced today)

But: does accountability too readily become auditability (through metricisation)?

Squaring the circle: responsibility and responsible metrics



<http://sfdora.org>

NATURE | COMMENT 🔗 ✉️ 🖨️

Bibliometrics: The Leiden Manifesto for research metrics

Diana Hicks, Paul Wouters, Ludo Waltman, Sarah de Rijcke & Ismael Rafols

22 April 2015

Use these ten principles to guide research evaluation, urge Diana Hicks, Paul Wouters and colleagues.

[PDF](#) [Rights & Permissions](#)

Subject terms: [Careers](#) · [Research management](#) · [Publishing](#)


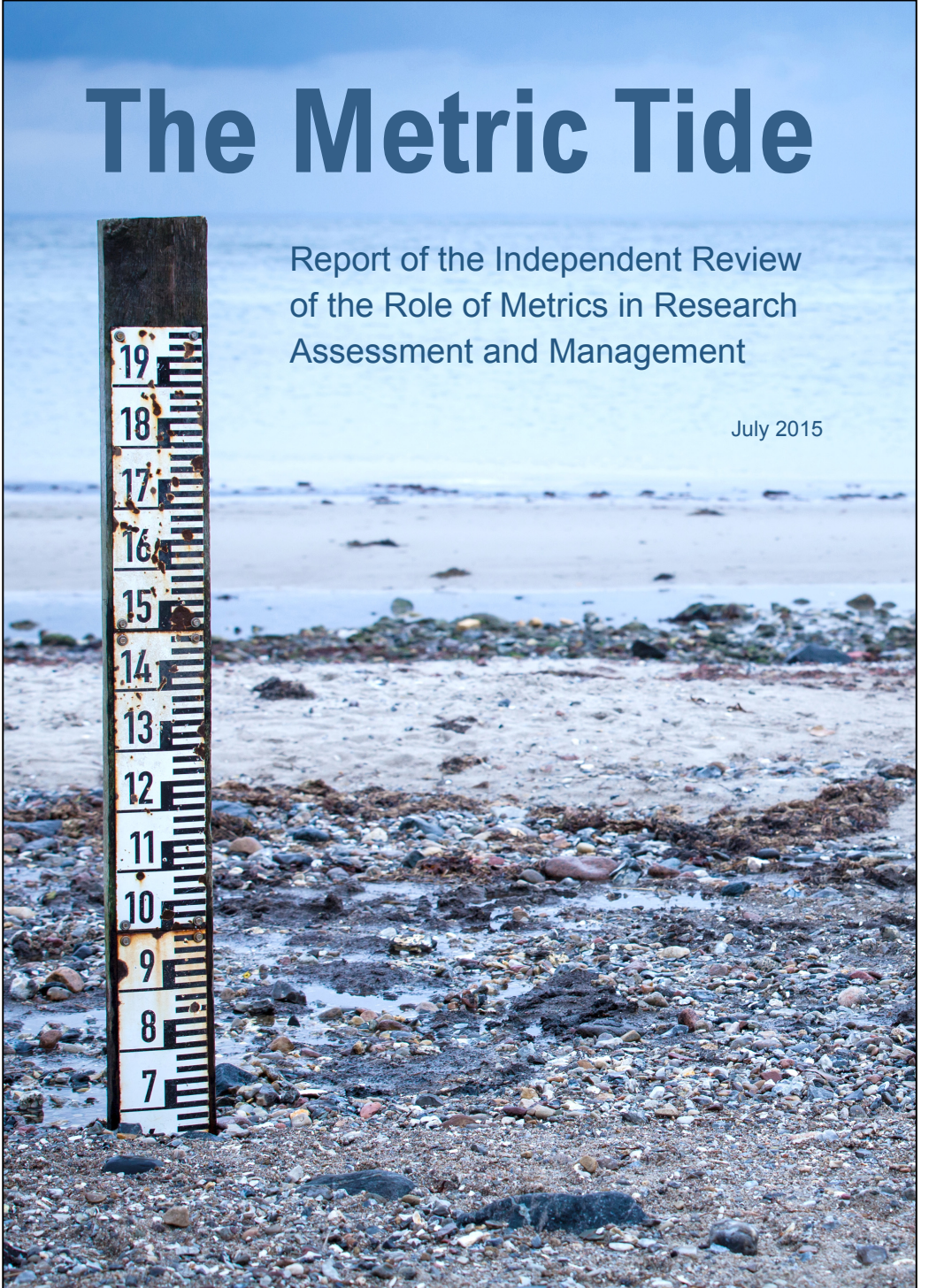
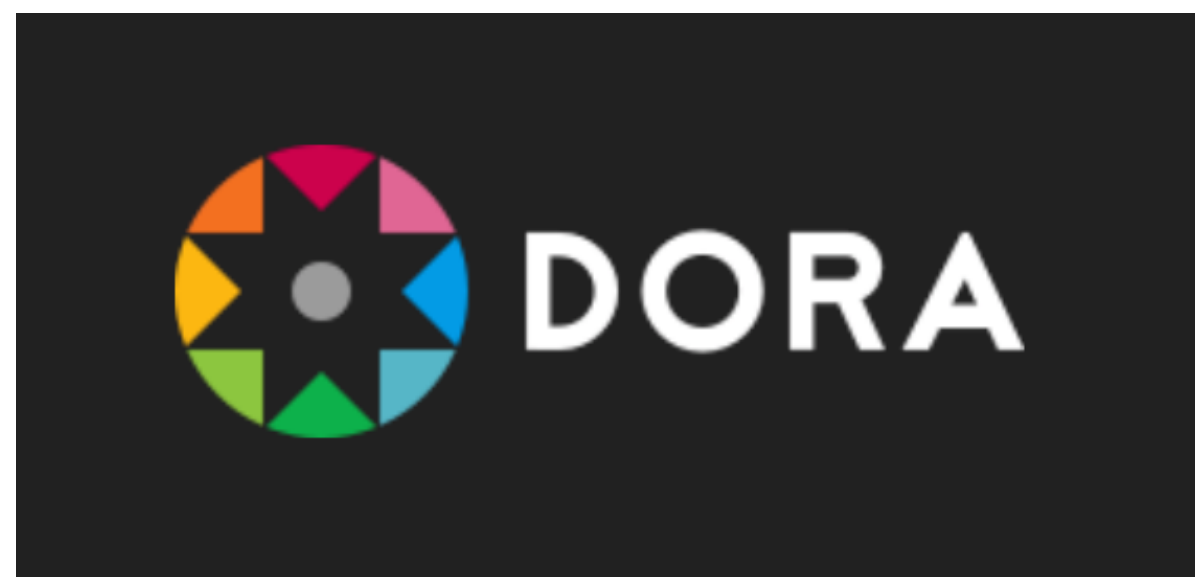


Illustration by David Parkins

The illustration shows a bronze statue of 'The Thinker' by Auguste Rodin. The figure is seated on a rock, leaning forward with his chin resting on his hand in a state of deep thought. A hand from above holds a long, thin measuring tool (like a ruler or a level) against the top of his head, as if measuring his thoughts or the weight of his contemplation.

Squaring the circle: responsibility and responsible metrics

“The English are always degrading truths into facts. When a truth becomes a fact, it loses all its intellectual value.”



<http://sfdora.org>

NATURE | COMMENT

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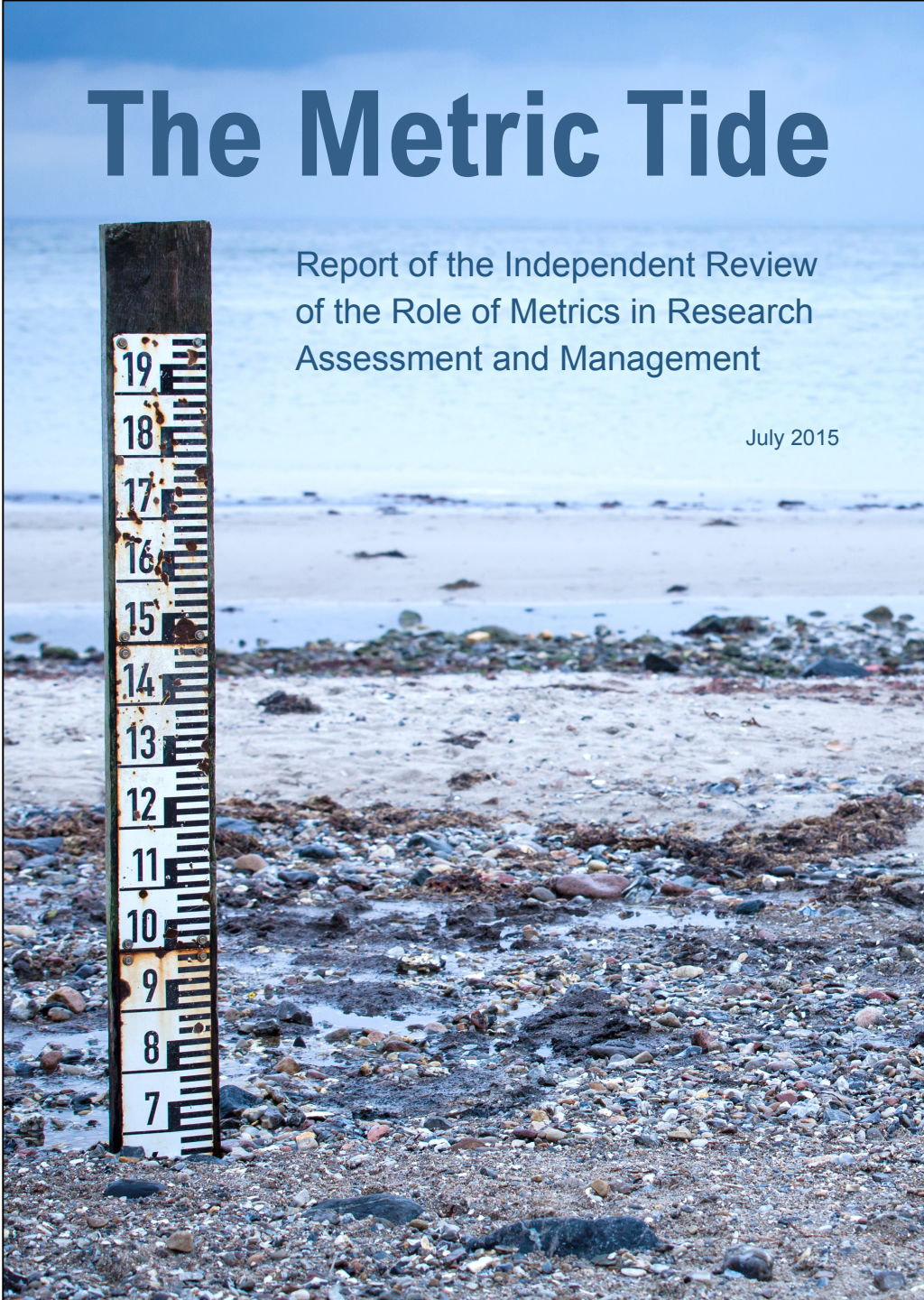
Illustration by David Parkins

The image shows a screenshot of a Nature journal article. The main title is "Bibliometrics: The Leiden Manifesto for research metrics". Below the title are the authors' names and the date. There are buttons for "PDF" and "Rights & Permissions". Below that are subject terms. The main image is an illustration of the "The Thinker" statue by Auguste Rodin, but instead of resting his chin on his hand, he is holding a measuring tool (like a caliper or a similar device) to his head. The background is a light blue and white gradient.

The Metric Tide

Report of the Independent Review of the Role of Metrics in Research Assessment and Management

July 2015

The image shows the cover of a report titled "The Metric Tide". The title is in a large, bold, blue font. Below it is the subtitle "Report of the Independent Review of the Role of Metrics in Research Assessment and Management" in a smaller, blue font. The date "July 2015" is in the bottom right. The background image is a photograph of a tide gauge on a beach. The gauge is a vertical wooden post with a white scale marked from 7 to 19. The beach is covered in pebbles and seaweed, and the ocean is visible in the background under a blue sky.

Research evaluation through narrative

Researcher assessment at UMC Utrecht

1. Research, publications, grants
2. Managerial & academic duties
3. Mentoring & teaching
4. Clinical work (if applicable)
5. Entrepreneurship & outreach



Fewer numbers, better science

Scientific quality is hard to define, and numbers are easy to look at. But bibliometrics are warping science — encouraging quantity over quality. Leaders at two research institutions describe how they do things differently.

<http://www.nature.com/news/fewer-numbers-better-science-1.20858>

DORA ([sfdora.org](https://www.nature.com/articles/d41586-018-01642-w))

Now 5 years old; >12,000 individuals & >500 organisations signed

New funding

New steering group

New URL - [sfdora.org](https://www.nature.com/articles/d41586-018-01642-w)

New Roadmap:

1. Increase awareness of the need to develop alternatives to the JIF
2. Research and promote best practice in research assessment.
3. Extend the global and disciplinary impact of DORA

New international advisory board (coming soon...)

https://www.nature.com/articles/d41586-018-01642-w

WORLD VIEW A personal take on events



Words were a good start — now it is time for action

Five years ago, the Declaration on Research Assessment was a rallying point. It must now become a tool for fair evaluation, urges Stephen Curry.

Declarations are bound to fall short. The 240-year-old United States Declaration of Independence holds it self-evident that “all men [sic] are created equal”, but equality remains a far-off dream for many Americans.

The San Francisco Declaration on Research Assessment (DORA; <https://sfdora.org>) is much younger, but similarly idealistic. Conceived by a group of journal editors and publishers at a meeting of the American Society for Cell Biology (ASCB) in December 2012, it proclaims a pressing need to improve how scientific research is evaluated, and asks scientists, funders, institutions and publishers to forswear using journal impact factors (JIFs) to judge individual researchers.

DORA’s aim is a world in which the content of a research paper matters more than the impact factor of the journal in which it appears. Thousands of individuals and hundreds of research organizations now

agree and have signed up. Momentum is building, particularly in the United Kingdom, where the number of university signatories has trebled in the past two years. This week, all seven UK research councils announced their support.

Impact factors were never meant to be a metric for individual papers, let alone individual people. They’re an average of the skewed distribution of citations accumulated by papers in a given journal over two years. Not only do these averages hide huge variations between papers in the same journal, but citations are imperfect measures of quality and influence. High-impact-factor journals may publish a lot of top-notch science, but we should not outsource evaluation of individual researchers and their outputs to seductive journal metrics.

Most agree that yoking career rewards to JIFs is distorting science. Yet the practice seems impossible to root out. In China, for example, many universities pay impact-factor-related bonuses, inspired by unwritten norms of the West. Scientists in parts of Eastern Europe cling to impact factors as a crude bulwark against cronyism. More worryingly, processes for JIF-free assessment have yet to gain credibility even at some institutions that have signed DORA. Stories percolate of research managers demanding high impact factors. Job and grant applicants feel that they can’t compete unless they publish in prominent journals. All are fearful of shuffling off the familiar harness.

So, DORA’s job now is to accelerate the change it called for. I feel the need for change whenever I meet postdocs. Their curiosity about the world and determination to improve it burns bright. But their desires to pursue the most fascinating and most impactful questions are subverted by our systems of evaluation. As they apply for their first permanent positions, they are already calculating how to manoeuvre within the JIF-dependent managerialism of modern science.

There have been many calls for something better, including the Leiden Manifesto and the UK report ‘The Metric Tide’, both released in

2015. Like DORA, these have changed the tenor of discussions around researcher assessment and paved the way for change.

It is time to shift from making declarations to finding solutions. With the support of the ASCB, Cancer Research UK, the European Molecular Biology Organization, the biomedical funder the Wellcome Trust and the publishers the Company of Biologists, eLife, F1000, Hindawi and PLOS, DORA has hired a full-time community manager and revamped its steering committee, which I head. We are committed to getting on with the job.

Our goal is to discover and disseminate examples of good practice, and to boost the profile of assessment reform. We will do that at conferences and in online discussions; we will also establish regional nodes across the world, run by volunteers who will work to identify and address local issues.

IT’S WORTH DOING THE EXPERIMENT TO PROPERLY EVALUATE.

This week, for example, DORA is participating in a workshop at which the Forum for Responsible Metrics — an expert group established following the release of ‘The Metric Tide’ — will present results of the first UK-wide survey of research assessment. This will bring broader exposure to what universities are thinking and doing, and put the spotlight on instances of good and bad practice.

We have to get beyond complaining, to find robust, efficient and bias-free assessment methods. Right now, there are few compelling options. I favour concise one- or two-page ‘bio-sketches’, similar to those rolled out in 2016 by the University Medical Centre Utrecht in the Netherlands. These let researchers summarize their most

important research contributions, plus mentoring, societal engagement and other valuable activities. This approach could have flaws. Perhaps it gives too much leeway for ‘spin’. But, as scientists, surely we can agree that it’s worth doing the experiment to properly evaluate evaluation.

This is hard stuff: we need frank discussions that grind through details, with researchers themselves, to find out what works and to forestall problems. We need to be mindful of the damage wrought to the careers of women and minorities by bias in peer review and in subjective evaluations. And we need to join in with parallel moves towards open research, data and code sharing, and the proper recognition of scientific reproducibility.

Declarations such as DORA are important; credible alternatives to the status quo are more so. True success will mean every institution, everywhere in the world, bragging about the quality of their research-assessment procedures, rather than the size of their impact factors. ■

Stephen Curry is a professor of structural biology and assistant provost for equality, diversity and inclusion at Imperial College London. He is also chair of the DORA steering group. e-mail: s.curry@imperial.ac.uk

8 FEBRUARY 2018 | VOL 554 | NATURE | 147

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Thank You