

EEB 603 – Reproducible Science

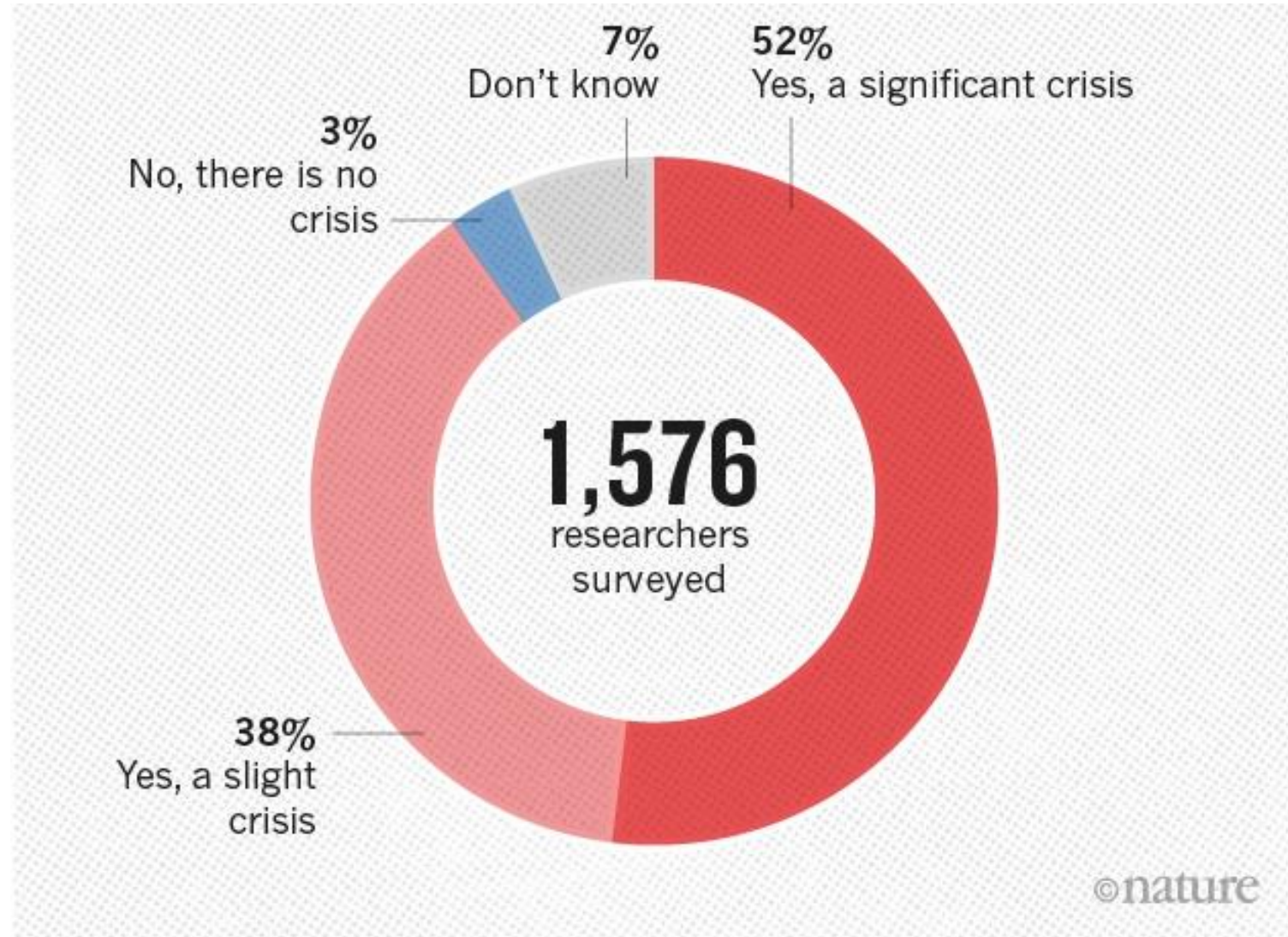
Chapter 1: What Factors Break Reproducibility?

“Reproducibility is like brushing your teeth. Once you learn it, it becomes a habit.”



BOISE STATE
UNIVERSITY

Is there a reproducibility crisis in Science?



SURVEY ON REPRODUCIBLE SCIENCE

A survey conducted on 1,576 researchers (Baker, 2016):

- 70% of researchers have tried and failed to reproduce another scientist's experiment(s).
- >50% of surveyed researchers have failed to reproduce their own experiments.

SURVEY ON REPRODUCIBLE SCIENCE

A survey conducted on 1,576 researchers (Baker, 2016):

- Although 52% of surveyed researchers agree that there is a significant “crisis” of reproducibility, less than 30% think that failure to reproduce published results means that results are probably wrong and most say that they trust published literature.
- 73% of the respondents said that they think that **at least half of the papers in their field can be trusted.**
- → This would mean that **50% of published studies are not reproducible** and/or convey wrong conclusions.

**Intense competition
and time pressure
==
irreproducible
research**

→ We all need to
change our
practices to turn
this situation
around

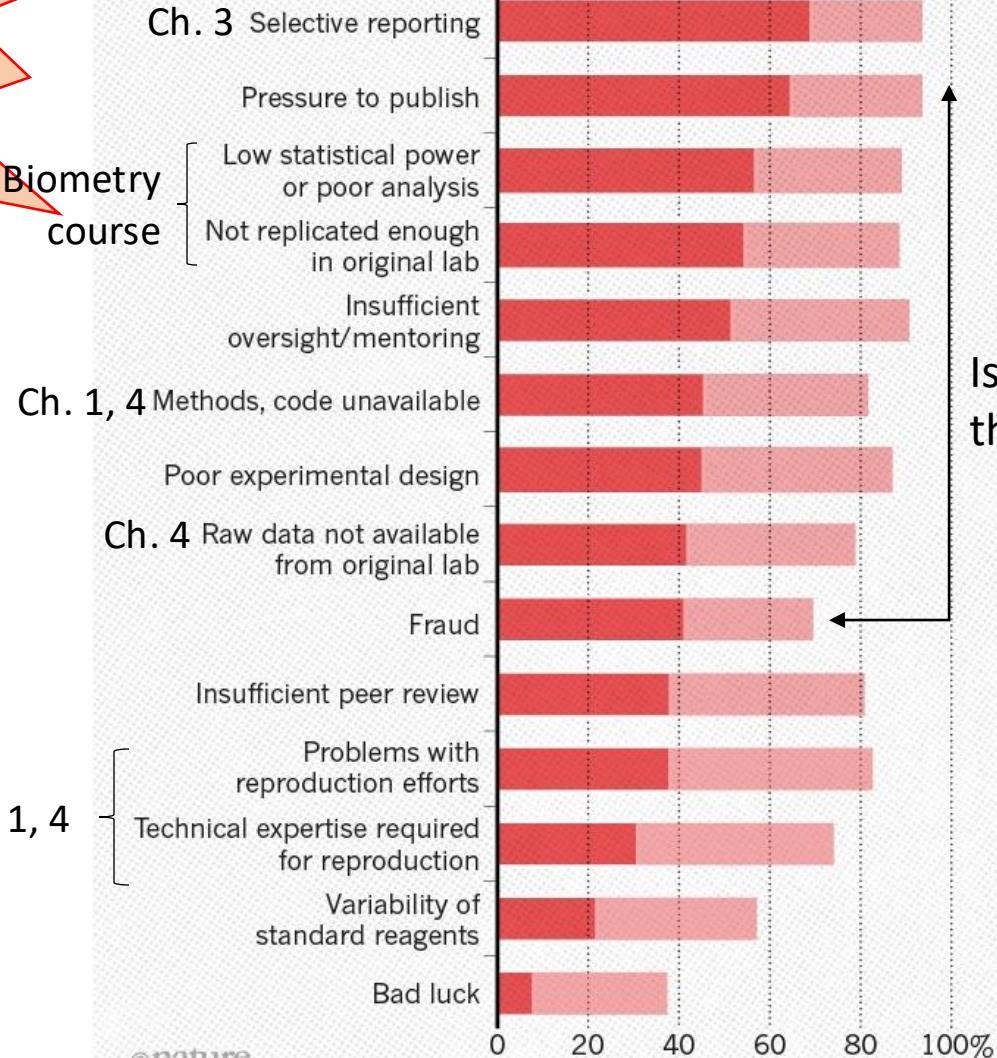
Biometry
course

Ch. 1, 4

WHAT FACTORS CONTRIBUTE TO IRREPRODUCIBLE RESEARCH?

Many top-rated factors relate to intense competition
and time pressure.

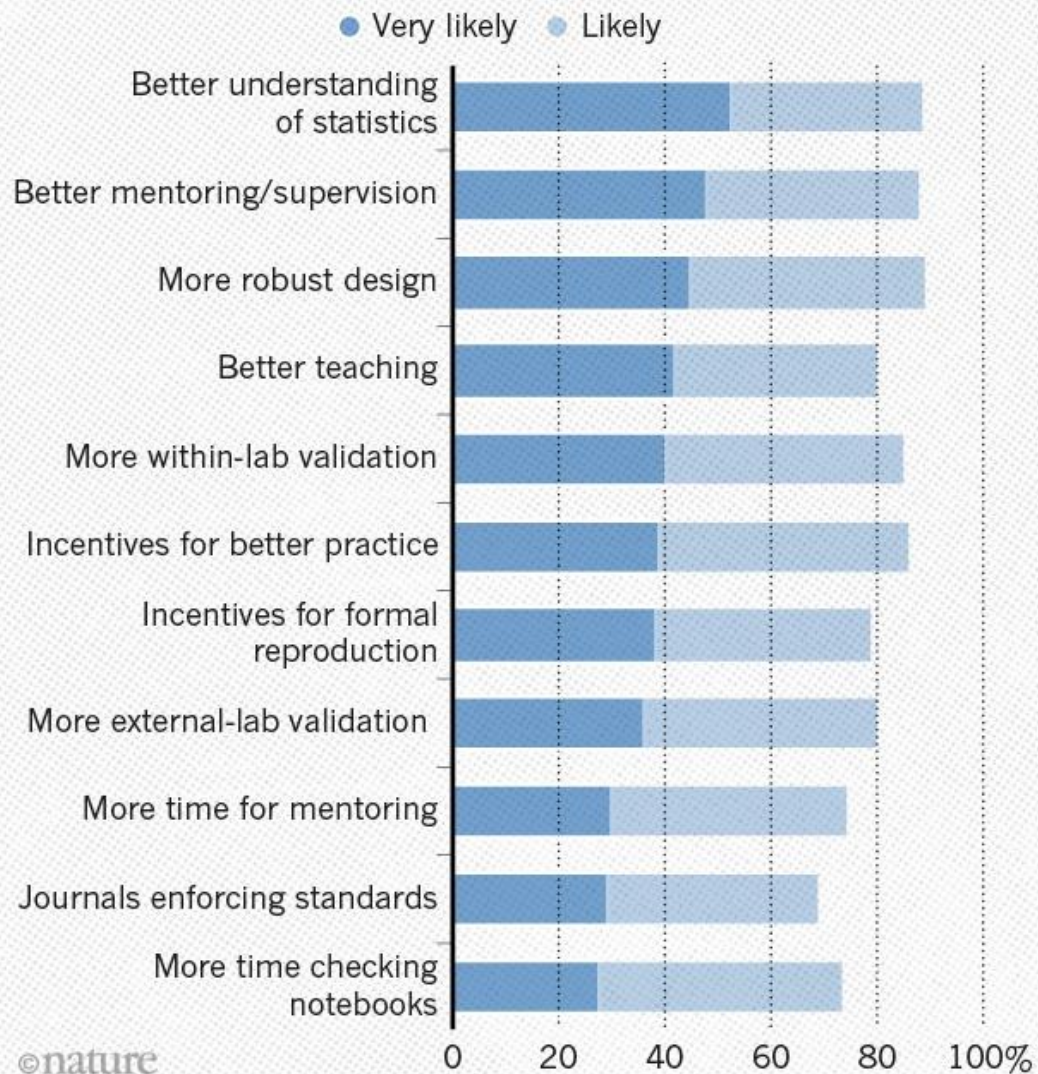
● Always/often contribute ● Sometimes contribute



Is there causality between
these factors?

WHAT FACTORS COULD BOOST REPRODUCIBILITY?

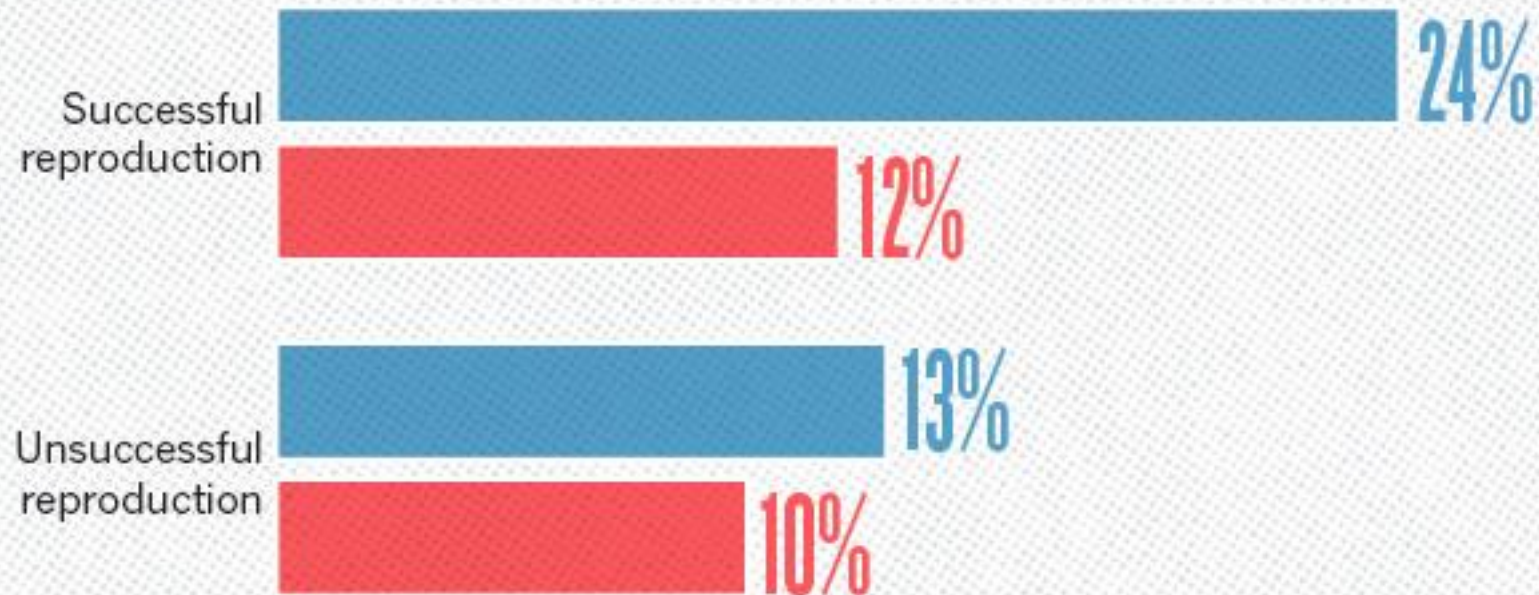
Respondents were positive about most proposed improvements but emphasized training in particular.



HAVE YOU EVER TRIED TO PUBLISH A REPRODUCTION ATTEMPT?

Although only a small proportion of respondents tried to publish replication attempts, many had their papers accepted.

● Published ● Failed to publish



<http://rescience.github.io/>

Reproducible Science is good. Replicated Science is better.

ReScience C is a *platinum open-access* peer-reviewed journal that targets computational research and encourages the explicit [replication](#) of already published research, promoting new and open-source implementations in order to ensure that the original research is [reproducible](#). You can read about the ideas behind ReScience C in the article [Sustainable computational science: the ReScience initiative](#)

To achieve this goal, the whole publishing chain is radically different from other traditional scientific journals. ReScience C lives on [GitHub](#) where each new implementation of a computational study is made available together with comments, explanations and tests. Each submission takes the form of an issue that is publicly reviewed and tested in order to guarantee that any researcher can re-use it. If you ever replicated computational results (or failed at) from the literature in your research, ReScience C is the perfect place to publish your new implementation.

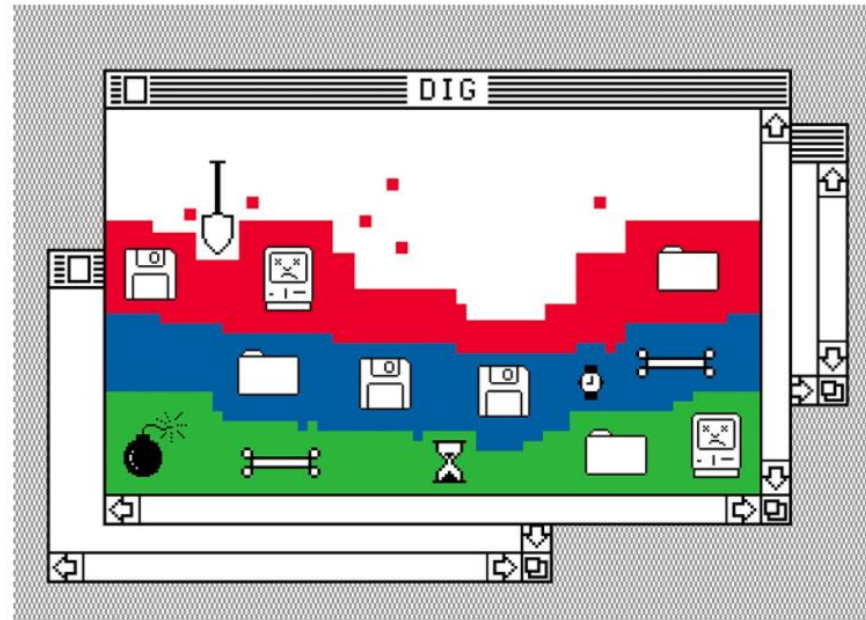
ReScience C is collaborative and open by design. Everything can be forked and modified. Don't hesitate to [write a submission](#), [join us](#) and to [become a reviewer](#).

TECHNOLOGY FEATURE • 24 AUGUST 2020

Challenge to scientists: does your ten-year-old code still run?

Missing documentation and obsolete environments force participants in the Ten Years Reproducibility Challenge to get creative.

Jeffrey M. Perkel



<https://www.nature.com/articles/d41586-020-02462-7#:~:text=Conceived%20in%202019%20together%20with,ten%20or%20more%20years%20earlier.>

Resurgence of retracted papers?



SHARE



What a massive database of retracted papers reveals about science publishing's 'death penalty'

By [Jeffrey Brainard](#), [Jia You](#) | Oct. 25, 2018, 2:00 PM

Rethinking retractions

Better editorial oversight, not more flawed papers, might explain a flood of retractions

Nearly a decade ago, headlines highlighted a disturbing trend in science: The number of articles retracted by journals had increased 10-fold during the previous 10 years. Fraud accounted for some 60% of those retractions; one offender, anesthesiologist Joachim Boldt, had racked up almost 90 retractions after investigators concluded he had fabricated data and committed other ethical violations. Boldt may have even harmed patients by encouraging the adoption of an unproven surgical treatment. Science, it seemed, faced a mushrooming crisis.

The alarming news came with some caveats. Although statistics were sketchy, retractions appeared to be relatively rare, involving only about two of every 10,000 papers. Sometimes the reason for the withdrawal was honest error, not deliberate fraud. And whether suspect papers were becoming more common—or journals were just getting better at recognizing and reporting them—wasn't clear.

Retraction Watch

Tracking retractions as a window
into the scientific process

<https://retractionwatch.com/>

GET RETRACTION WATCH IN
YOUR INBOX

Enter your email

GET OUR NEWSLETTER

Get the latest news from
Retraction Watch and beyond
Monday through Friday, plus
Weekend Reads each Saturday.

SUPPORT RETRACTION
WATCH

RETRACTION WATCH LISTS

The Retraction Watch
Leaderboard

Authors asked Elsevier to retract papers in 2012. In one case, they're still waiting.

Elsevier has retracted two papers for image duplication – 13 years after the authors alerted the journal to issues with the work.

The papers are the third and fourth retractions for a group of researchers in Ireland. The team had asked Elsevier journals to retract five papers in April 2012 — one of which is still in process.

The first two papers, published in *Cancer Letters*, were retracted in 2013.

Then last week, two more articles, published in the *European Journal of Pharmacology (EJP)*, were retracted.



Retraction Note | [Published: 01 June 2020](#)

Retraction Note: miR-34a blocks osteoporosis and bone metastasis by inhibiting osteoclastogenesis and Tgif2

Jing Y. Krzeszinski, Wei Wei, HoangDinh Huynh, Zixue Jin, Xunde Wang, Tsung-Cheng Chang, Xian-Jin Xie, Lin He, Lingegowda S. Mangala, Gabriel Lopez-Berestein, Anil K. Sood, Joshua T. Mendell & Yihong Wan [✉](#)

Nature **582**, 134(2020) | [Cite this article](#)

3611 Accesses | **3** Altmetric | [Metrics](#)

i The [original article](#) was published on 25 June 2014

Retraction to: *Nature* <https://doi.org/10.1038/nature13375> Published online 25 June 2014


Upon re-examination of the bone histomorphometry data in Extended Data Figs. 1i, 2d, 3h, 4h, 5n, 6e, 9g and 10f of this Letter, anomalies were found that call into question the integrity of these data. These concerns undermine the confidence in the study and the authors thus wish to retract the Letter in its entirety. The authors regret this situation and apologize to the scientific community. All authors agree with the Retraction, but author Xunde Wang did not respond.

Retraction Note: TREEFINDER: a powerful graphical analysis environment for molecular phylogenetics

[Gangolf Jobb](#) , [Arndt von Haeseler](#) & [Korbinian Strimmer](#)

[BMC Evolutionary Biology](#) **15**, Article number: 243 (2015) | [Cite this article](#)

8537 Accesses | **5** Citations | **124** Altmetric | [Metrics](#)

 The [original article](#) was published in BMC Evolutionary Biology 2004 4:18

Retraction

The editors of *BMC Evolutionary Biology* retract this article [[1](#)] due to the decision by the corresponding author, Gangolf Jobb, to change the license to the software described in the article. The software is no longer available to all scientists wishing to use it in certain territories. This breaches the journal's editorial policy on software availability [[2](#)] which has been in effect since the time of publication. The other authors of the article, Arndt von Haeseler and Korbinian Strimmer, have no control over the licensing of the software and support the retraction of this article.

Reproducibility and research integrity



Research integrity is an important driver of reliable and trustworthy research, and includes issues such as reproducibility and replicability. There is a need to promote robust research, starting at the lab bench and extending to the dissemination of findings to the scientific community, as well as to the public.

Following a [call from the UK House of Commons Science and Technology Committee](#) for evidence on reproducibility and research integrity, and the roles different institutions play in this, [BMC Research Notes](#) has partnered with the [UK Reproducibility Network](#) to provide a platform to share feedback on the topic with the wider scientific community.

<https://www.biomedcentral.com/collections/reproducibility>

Research Integrity and Peer Review

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Reporting quality of abstracts and inconsistencies with full text articles in pediatric orthopedic publications

Sherif Ahmed Kamel and Tamer A. El-Sobky

Research | 23 August 2023

Raising concerns on questionable ethics approvals – a case study of 456 trials from the Institut Hospitalo-Universitaire Méditerranée Infection

Fabrice Frank, Nans Florens, Gideon Meyerowitz-katz, Jérôme Barriere, Éric Billy, Véronique Saada, Alexander Samuel, Jacques Robert and Lonni Besançon

Aims and scope

Research Integrity and Peer Review is an international, open access, peer reviewed journal that encompasses all aspects of integrity in research publication, including peer review, study reporting, and research and publication ethics. Particular consideration is given to submissions that address current controversies and limitations in the field and offer potential solutions. We welcome research into peer review and editorial decision making, however reports of individual journal or publisher decisions or actions will not be considered.

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THEME OF THE YEAR

Rethinking Peer Review in the AI Era

15 – 19 September 2025

[Press Release](#)

Reproducible Science: Data, Code and Publication

