ESS 203 - Glaciers and Global Change

Monday February 21, 2021

Outline for today

- highlights of last Friday lecture: – *Justice Correa-West*
- Today's highlights on Wednesday: – *Brianna Bjolstad*

(Please remember to sign up to report highlights)

Outline for today

- Subscription-based *vs* Open-Access Publishers
- Scientific misconduct
- Correcting the science- what about public perception?
- Willful misrepresentation of science

Reading a Scientific Paper

When you read a scientific paper, keep these three questions in your mind:

1) What is the question that the paper tries to answer?
2) What is the answer (according to the authors)?
3) What points are still unclear to you?

HW 09 Assignment for Wednesday Jan 27

(a) Please read *The Lancet* article by Andrew Wakefield in 1998 (now retracted), and answer our 3 questions −

1)What is the question that the paper tries to answer?

2)What is the answer (according to the authors)?

3)What points are still unclear to you?

(b) Please also read the Feb 9, 2020 *Forbes* article by J. Cohen. In half a page to a page, please summarize your thoughts on the following themes:

- Why do people want to ignore the facts?
- In this post-truth world, who wins and who loses?
- How can we move forward?

Both are posted under the READING tab on the class web page.
https://courses.washington.edu/ess203/RESOURCES/READING/

HW 10 Literature Search Assignment for Friday Jan 29

Note extra lead time has been allotted to allow for consultation with your partner or partners.

(1) You have been assigned partners to work with you on this assignment. Check out **People > Library Groups.**

With your partners, carry out the reference searches assigned here. HW_10_Reference_searches.pdf

Turn in the names of your group members and the url address for the google doc that your group creates.

(2) Matt Parsons will be at our Friday class to answer your questions about the Library and about your literature searches.

Please enter a question or comment by Thursday on the Google doc at

https://docs.google.com/document/d/1bF0JNxu9FkIa3G3OcQZAsDLrwuICOiX-yxr8pfODW-I/edit#heading=h.5spg5w2dqiai

Now let's talk about publishers of scientific journals

Subscription-Based *vs* Open-Access publishing

Subscription-based (traditional) business model

- Publisher holds copyright.
- Publisher sells subscriptions to individuals and libraries.
- Authors pay page charges, or journal includes paid advertising. Which journals?
  - Journals publishing medical research papers, but not for *Journal of Glaciology* ☺
- Page charges are billed *after* a paper has been accepted and typeset. Why?
  - Authors don't want to pay if their paper isn't going to be published.
  - Journals don't want to be seen as a vanity press.

Subscription-Based *vs* Open-Access publishing

Subscription-based (traditional) business model

- Funding agencies (e.g. NSF, NASA, ESF, ESA, NOAA, …) *expect* to see publication costs as a line item in grant applications.
  - They pay for the research − they want it to be published.
- Most research universities subscribe to and offer many peer-reviewed scientific journals at no cost to their faculty and students.

Subscription-Based *vs* Open-Access publishing

Subscription-based (traditional)

- Access to journals can be expensive for entrepreneurs and small businesses.
- They argue that when tax dollars pay for research, the results should be available free to citizens.
- Is everything the government pays for also free to everybody?
  - Tolls on SR 520, I-405, I-90 tunnel …?
  - Airport tax on airline tickets, … ?

  - So the answer may not be so clear-cut …

Subscription-Based *vs* Open-Access publishing

OA – Open-Access (web model)

- Authors can retain copyright.
- Papers are posted online with free access.
- Some OA journals also post all versions of a paper and all reviewer comments during peer review.

For some OA journals, authors pay publication costs when paper is submitted.

For other OA journals payment is after a paper is accepted.

- Gold OA – results available immediately from publisher.
- Green OA – authors can post publications in freely accessible repositories, often with a required delay of only a few months.

Subscription-Based *vs* Open-Access publishing

OA – Open-Access (web model)

- OA can dramatically increase flow of information.
  - Private entrepreneurs can see whatever you can see.
  - New ideas can be visible right from time of submission (in some OA journals).
  - whole peer-review process can be transparent (in some OA journals).
- There are tradeoffs in anonymity *vs* openness.
- Most publishers are trustworthy and ethical.
- Is there possibly a potential down side to the OA business model?

Who's Afraid of Peer Review?

A spoof paper concocted by *Science* reveals little or no scrutiny at many open-access journals

On 4 July, good news arrived in the inbox of Ocorrafoo Cobange, a biologist at the Wassee Institute of Medicine in Asmara. It was the official letter of acceptance for a paper he had submitted 2 months earlier to the *Journal of Natural Pharmaceuticals*, describing the anticancer

subscriptions. Most of the players are murky. The identity and location of the journals' editors, as well as the financial workings of their publishers, are often purposefully obscured. But *Science*'s investigation casts a powerful light. Internet Protocol

http://www.sciencemag.org/content/342/6154/60.full

Predatory journals - Sting by *Science* 2013

On 4 July, good news arrived in the inbox of Ocorrafoo Cobange, a biologist at the Wassee Institute of Medicine in Asmara. It was the official letter of acceptance for a paper he had submitted 2 months earlier to the *Journal of Natural Pharmaceuticals*, describing the anti-cancer properties of a chemical that Cobange had extracted from a lichen.

In fact, it should have been promptly rejected. Any reviewer with more than a high-school knowledge of chemistry and the ability to understand a basic data plot should have spotted the paper's shortcomings immediately. Its experiments are so hopelessly flawed that the results are meaningless.

J. Bohannon, *Science* **342**, p. 60-65. Oct 4, 2013.

Predatory journals - Sting by *Science* 2013

I know because I wrote the paper. Ocorrafoo Cobange does not exist, nor does the Wassee Institute of Medicine. Over the past 10 months, I have submitted 304 versions of the wonder drug paper to open-access journals. More than half of the journals accepted the paper, failing to notice its fatal flaws. Beyond that headline result, the data from this sting operation reveal the contours of an emerging Wild West in academic publishing.

From humble and idealistic beginnings a decade ago, open-access scientific journals have mushroomed into a global industry, driven by author publication fees rather than traditional subscriptions. Most of the players are murky. The identity and location of the journals' editors, as well as the financial workings of their publishers, are often purposefully obscured.

J. Bohannon, *Science* **342**, p. 60-65. Oct 4, 2013.

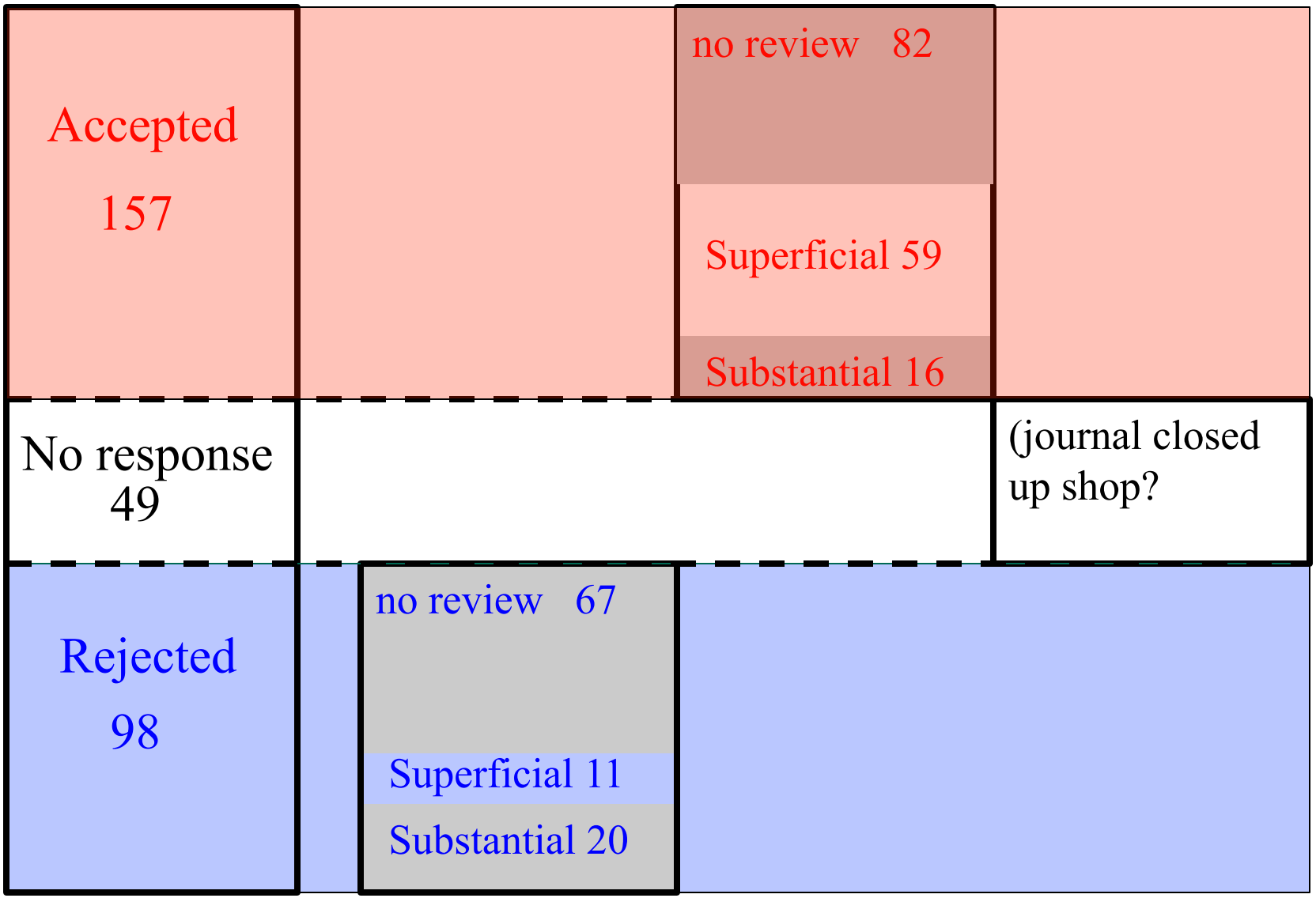
Predatory journals - Sting by *Science* 2013

But *Science*'s investigation casts a powerful light. Internet Protocol (IP) address traces within the raw headers of e-mails sent by journal editors betray their locations. Invoices for publication fees reveal a network of bank accounts based mostly in the developing world. And the acceptances and rejections of the paper provide the first global snapshot of peer review across the open-access scientific enterprise.

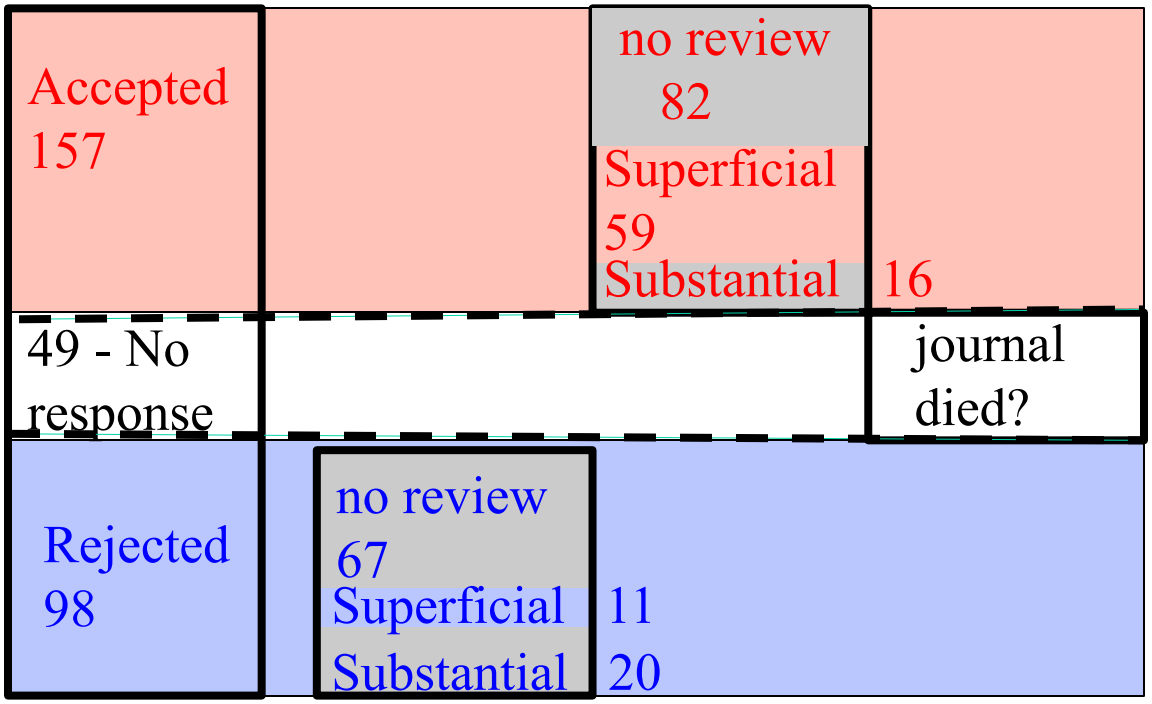
J. Bohannon, *Science* **342**, p. 60-65. Oct 4, 2013.

The Results

Submitted - 304

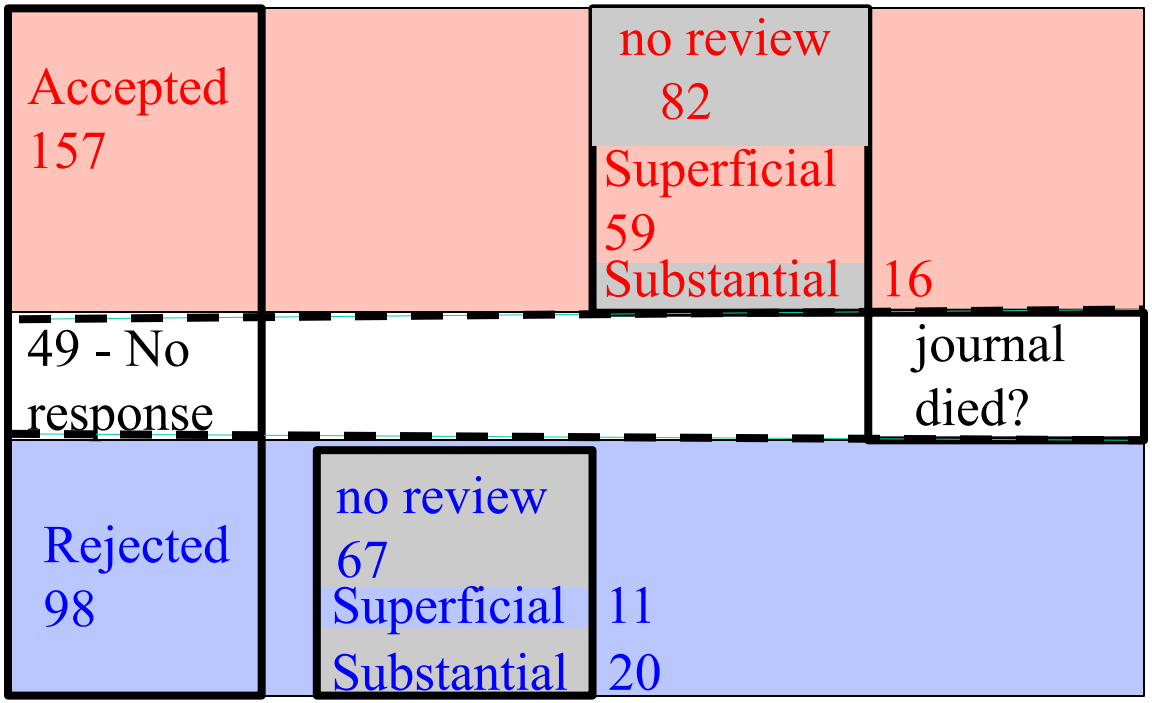


The Results



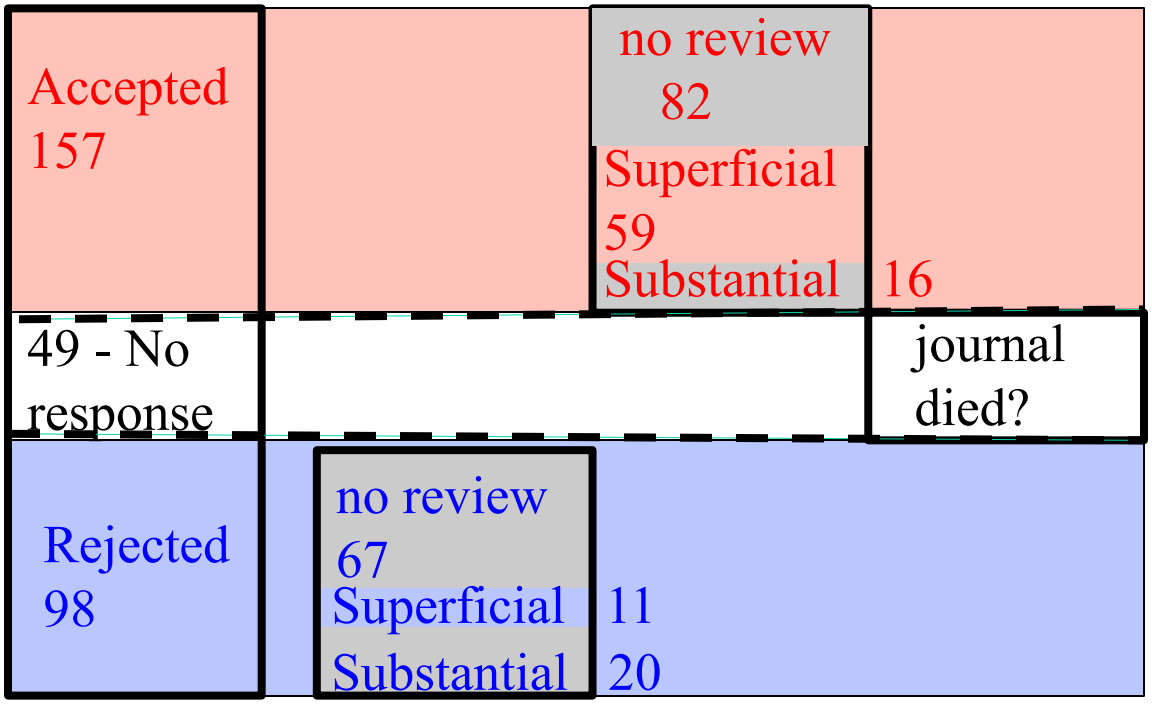
By the time *Science* went to press, 157 of the journals had accepted the paper and 98 had rejected it. Of the remaining 49 journals, 29 seem to be derelict: websites abandoned by their creators. …

Of the 255 papers that underwent the entire editing process to acceptance or rejection, about 60% of the final decisions occurred with no sign of peer review.



The Results

For rejections, that's good news: It means that the journal's quality control was high enough that the editor examined the paper and declined it rather than send it out for review. But for acceptances, it likely means that the paper was rubber-stamped without being read by anyone.



The Results

Of the 106 journals that discernibly performed any review, 70% ultimately accepted the paper. Most reviews focused exclusively on the paper's layout, formatting, and language. This sting did not waste the time of many legitimate peer reviewers. Only 36 of the 304 submissions generated review comments recognizing any of the paper's scientific problems. And 16 of those papers were accepted by the editors despite the damning reviews.

So what's going on?

While OA has advantages, the format is also vulnerable to exploitation by disreputable operators.

- Journal can claim to be peer-reviewed. Who's checking?
- Journal names can mimic names of established and respected journals to lure in unsuspecting authors.

'The *American Journal of Polymer Science* describes itself as "a continuous forum for the dissemination of thoroughly peer-reviewed, fundamental, international research into the preparation and properties of macromolecules."
Plugging the text into an Internet search engine, I quickly found that portions had been cut and pasted from the website of the *Journal of Polymer Science*, a respected journal published by Wiley since 1946.'

So what's going on?

While OA has advantages, the format is also vulnerable to exploitation by disreputable operators.

- When authors pay up-front, a journal doesn't need a subscription-department staff (or an editorial staff, apparently). A single "editor" can publish a whole string of "peer-reviewed" journals without doing the promised peer-review and editorial work, and still collect large publication fees.
- Will this become a new vanity press for aspiring scientists, particularly in the developing world?
- And often paid for with tax-payer money?

Peer review working well

Nature,
Feb13, 2020.

A complex web is unravelling in the field of spider research. On 5 February, McMaster University in Hamilton, Canada, confirmed that it was investigating allegations that behavioural ecologist Jonathan Pruitt had fabricated data in at least 17 papers that he had co-authored.

The world this week

News in focus

A study on the social spider *Stegodyphus dumicola* was the first to be retracted.

'AVALANCHE' OF RETRACTIONS SHAKES BEHAVIOURAL-ECOLOGY COMMUNITY

Allegations of fabricated data in papers on spider behaviour have prompted a university investigation and some soul-searching.

https://www.nature.com/articles/d41586-020-00287-y

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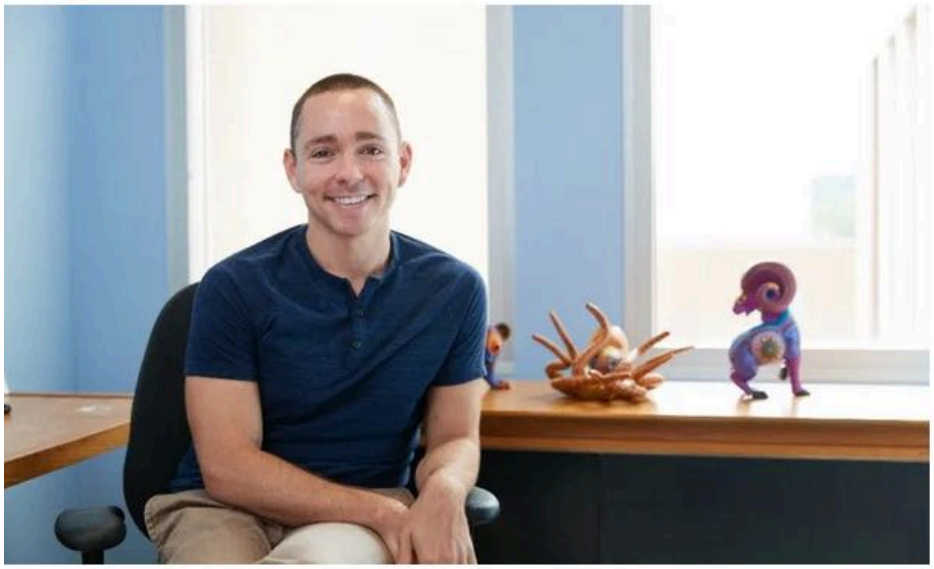
Since concerns about his work became public in late January, scientists have rushed to uncover the extent of questionable data in Pruitt's studies. Publishers are now trying to keep up with requests for retractions and investigations. So far, seven papers have been retracted or are in the process of being retracted; five further retractions have been requested by Pruitt's co-authors; and researchers have flagged at least five more studies as containing possible data anomalies.

The retractions started in mid-January, when authors of a paper in *The American Naturalist* pulled it, citing "irregularities in the raw data". These were data that Pruitt had provided, showing how long it takes social spiders to resume typical behaviours after a disturbance, such as a simulated attack from a predator.

A spokesperson for McMaster University confirmed that the institution was investigating, but would provide no further comment on issues of research integrity. The University of California, Santa Barbara, where Pruitt did most of the work in question, declined to comment on the specific case but said that it "would cooperate with any other institution conducting an investigation".

https://www.nature.com/articles/d41586-020-00287-y



Jonathan Pruitt

Retractionwatch.com

– Nick DiRienzo (@Niku_DiRienzo)
August 19, 2020

Spider researcher uses legal threats, public records requests to prevent retractions.

The case of Jonathan Pruitt, a spider researcher suspected of fabricating data in potentially dozens of studies, keeps getting weirder.
Pruitt, according to our count, now has six retractions. Currently associate professor and Canada 150 Research Chair at McMaster University in Hamilton, Ontario, he made a name for himself by providing other scientists with field data — much of which now appears to be unreliable.

…

https://retractionwatch.com/2020/08/20/spider-researcher-uses-legal-threats-public-records-requests-to-halt-correction-of-the-record/

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What factors encourage cheating?

NEWS MISCONDUCT SPECIAL NATURE|Vol 445|18 January 2007

Breeding cheats

Understanding the social and psychological factors behind scientific misconduct will enable bad practice to be minimized, but never eliminated, says **Jim Giles**.

- "Employees are more likely to behave unethically if they believe their managers are treating them unfairly".

Nature 445(7125) 242-243. January 18, 2007.

What factors encourage cheating?

"Take one prestigious laboratory. Add some pressing grant deadlines and a dash of apprehension about whether the applications will succeed. Throw in an overworked lab head, a gang of competitive postdocs and some shoddy record-keeping. Finally, insert a cynical scientist with a feeling that he or she is owed glory. It sounds hellish, but elements of this workplace will be familiar to many researchers. And that's worrying, as such an environment is, according to sociologists, the most fertile breeding ground for research misconduct."

Nature 445(7125) 242-243. January 18, 2007.

What other factors encourage cheating?

OK, we have reviewed competition within labs and between competing research labs.

What other pressures could there be?

- Follow the ideology?
- Follow the money?

So what's going on?

For every successful human endeavor (and peer review is an extremely successful human endeavor), we can also expect a cadre of unscrupulous and shady operators who live in loopholes and exploit the unsuspecting.

- Some regulations or new protocols are needed.
- Nevertheless, peer review is still the best way to evaluate scientific work.
- Most journals are genuine and honorable, but there are some disreputable firms lurking out there …
- If in doubt about a journal, check e.g. in DOAJ (Directory of Open Access Journals)

https://doaj.org//

There are probably other good sources as well.

Journalism and Science

What does the American Public know,
and when does it know it?

Facets of Scientific Communication

And why should we care?

Communication among scientists

- Peer review enhances accuracy and cooperation.
- Peer review keeps science honest.

Communication between scientists and "stakeholders"

- Journalists
- The public (taxpayers)
- Policy makers (politicians and bureaucrats)
- There are many opportunities to misunderstand.

Science or misrepresentation of science

- Used as a political weapon to create controversy?
- Can you filter out the "spin"?

Autism and MMR* vaccine

*Measles Mumps and Rubella

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

- Claimed a connection between vaccination and onset of autism within about 2 weeks in a study of 12 children.

Early report

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

- Peer reviewers thought study was suggestive of a link at best (It's in "Early Reports" section of the journal, after all).
- A commentary in the same issue questioned cause and effect:
  - Millions of children are vaccinated around age 2
  - Autism symptoms generally first noticed at age 2
  - Is it just a coincidence?

But, paper became centerpiece of political anti-vaccination campaign

- Peer review had identified failings, but ideology and politics trumped peer review.

What's the problem?

- Less than 70 years ago, diseases like measles, mumps, rubella, diphtheria, others, killed many young children and damaged many more.
- Public health vaccination initiatives reduced these diseases to <1% of the previous rates, by achieving "herd immunity".
- Large studies consistently show that chance of injury from vaccination is many orders of magnitude smaller than risk of serious injury or death from the diseases.
- However, as more frightened parents refuse to let their children be vaccinated, we as a society are losing "herd immunity".
- Once-conquered diseases are resurgent (and are again killing children).

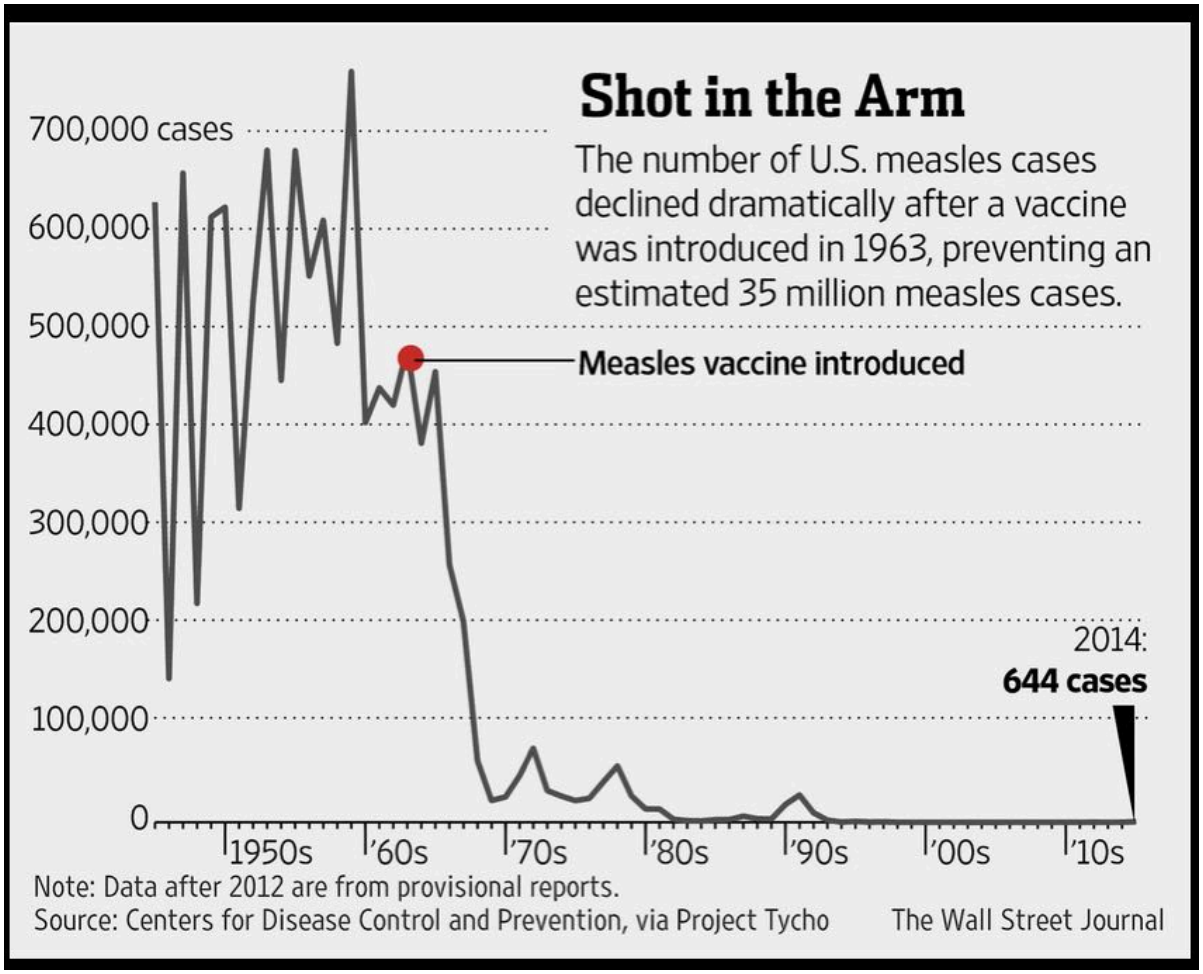
The Wall Street Journal, Feb 6, 2015

How Anti-Vaccination Trends Vex Herd Immunity

Measles Outbreak Underscores Vulnerabilities Posed by Subpar Innoculation Rates

By JO CRAVEN MCGINTY

Feb. 6, 2015



Winter of 2014-2015

The New Yorker, Feb 4, 2015.

While the measles vaccine is overwhelmingly effective, infants don't receive their first measles, mumps, and rubella, or M.M.R., shot until their first birthday, which means they're vulnerable during the precise time when a measles infection is most dangerous.

…

Efforts to combat these mistaken beliefs have made one thing clear: it's much easier to scare people than it is to dispel fears, regardless of how dangerous and untrue they are.

The New York Times - Jan 8, 2020

After a Measles Scare, Seattle Cracks Down on Vaccine Compliance

A Seattle student received a vaccine that the school district provided at a free immunization clinic last month. Elaine Thompson/Associated Press

At a time when states and school districts are trying to increase vaccination rates, an aggressive strategy in Seattle appears to be paying off.

MMR Wakefield story - Fast forward 12 years

May 2010
UK GMC (General Medical Council) "struck off" Wakefield for ethics violations in the MMR study. (i.e. took away his license to practice medicine.)

- Improper procedures on children without consent.
- Failure to disclose that study was paid for by a lawyer attempting to sue MMR vaccine manufacturer.

And one more year - 2011

January 8, 2011

British Medical Journal published investigative article showing that the data in the study were fraudulent.

Data were altered to "show" purported link.

- Children in study had been recruited from anti-vaccination lobby groups.
- Dates of symptoms (in some cases months after vaccination) were altered to be within 2 weeks of vaccination to fit the story.
- Intestinal problems that didn't fit the story were restated in more vague general terms (e.g. child constipated instead of having diarrhea, symptom just stated as "non-specific colitis".
- 5 of 12 children had autism symptoms ***before*** vaccination.

Reactions?

- Wakefield swears he is innocent of wrongdoing.
- Anti-vaccination campaigners claim he is victim of a smear campaign.
- They claim that he is really the hero of the people, being silenced by profit motive of Big Pharma.

- What do you think?

Questions for Curious Scientists and Science Watchers …
Fraud in Science is rare
but it can happen …

Group Discussions – please address all 5 questions.

- Why might some scientists commit fraud?
- Why does Peer Review not always prevent it?
- Can cheaters "steal" the scientific agenda?
- How *do* cheaters get caught?
- Why and how might Open-Access publishers commit fraud?

https://docs.google.com/document/d/1XL-OXheSPGHmNI-boWF-oDVdaqsIV0axS4BH-EB9S6c/edit