Science and Ethical Dilemmas in the Blogosphere

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Outline

- Who I am?
- Blogging – What is this? Should you blog?
- The #ArsenicLife Saga
- Discussion

Please interrupt me

Tweeting during the lecture is OK

Who am I ?

- **Assistant Researcher** at UC Berkeley from October 2000 to June 2011
- Started blogging for the **Cosmic Diary**, a Cornerstone project of the International Year of Astronomy (January 2009)
- **Principal Investigator** at SETI Institute in July 2007,
- **Editor & Maintainer** of the Cosmic Diary Network since Feb 2011
- Join **Twitter** (@AllPlanets) in Aug 2010 (1,300 followers including ~60 scientific journalists)
- Manager of G+, Facebook, Twitter **SETI Institute accounts** (750 K followers) since January 2012
- Education Public Outreach co-leader for **GPI** (Jan. 2012)
- **Media, science & technology coordinator** at SETI Institute since November 2012

Who am I ?

- "*You are wasting your time with this blog*". Am I?
- **Highlighted Posts** (among 137) from my blog
  - June 2009, Jupiter got a bruise
  - April 2011, today the ATA is hibernating
  - July 2011, 90 Antiope Campaign of Observation
  - September 2012, A Meteor on Jupiter
  - April 2012, Sutter Mill Meteorite

-> **"Science discussion"** These posts were quoted/used in scientific magazine and/or main stream media

-> **"Work"** Started new collaborations from colleagues who contacted me after reading them

-> **"Personal"** I learned a lot while writing them

- Today I focus most of my energy on micro-blogging (Twitter) and Google Hangout (see SETI G+ page)

Blogging Today

- **Wikipedia Definition** “A blog is a discussion or informational site published on the World Wide Web and consisting of discrete entries ("posts") typically displayed in reverse chronological order”
- Blogging is has changed over the year
  - Late 1990s -> lengthy web pages
  - Today -> **Micro-blogging** (Twitter, Tumblr)
  - Today ~160 million public blogs (Wordpress 57E6, Tumblr 77E6), Twitter (140E6,)

There is “Blogging” and “Blogging”

Broad variety of blogs:

- **Personal Blogs** made of posts/articles (diary, celebrity, family, writing, art, picture, science, politics, …)
- **Microblogging** (short post with links/pictures/ videos/articles, e.g. Twitter)
- **Social media** (structure of G+ similar to a blog, longer post)
- **Theme blogs** (group of bloggers with common interest)
- **Corporate blog** (to discuss products, situation of the company, answer to customers)

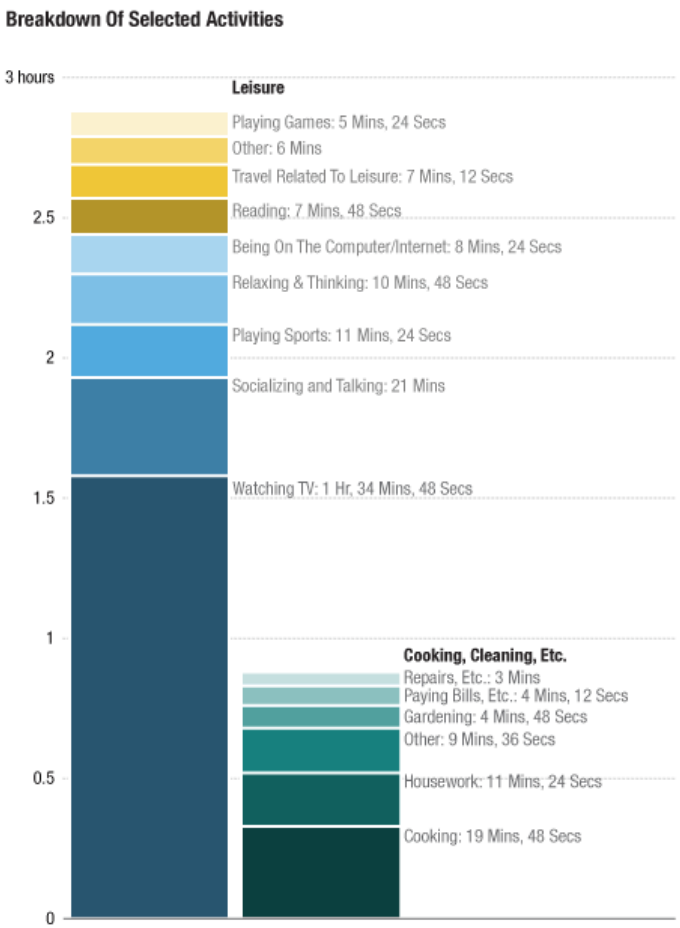
The Risks of Blogging

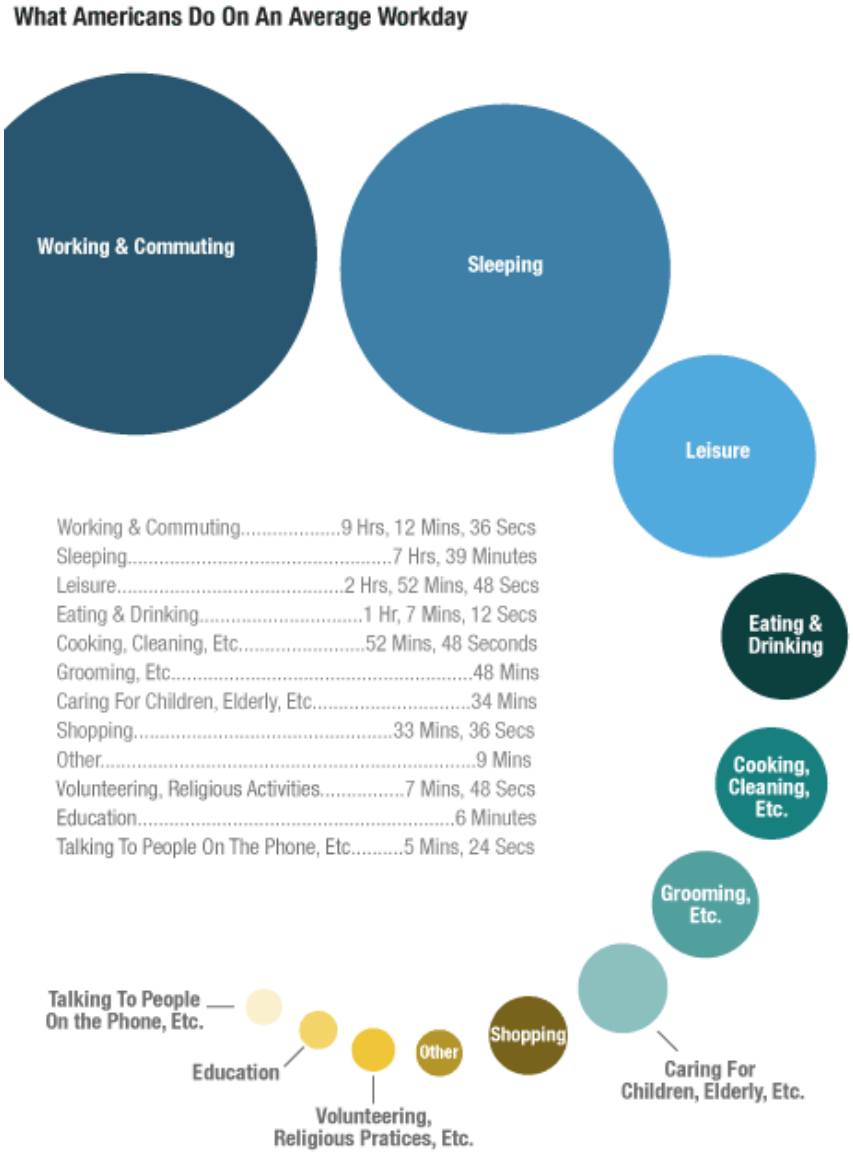
- As a blogger you are **exposing yourself**, so you are taking risks (something I did not realize until recently)
- **Legal & social risks**
  - Defamation and liability
  - Complex relationship with employer
  - Political danger
  - Personal safety
- **Rule:** Don't write anything online (in your blog, in your tweet, in your commentaries, …) that you will not say in person

Should You Blog?

- **Blurring of the frontier** between mass media, blogs, and social media.
  - **Journalists** have their own blog (no need for the newspaper to publish their idea)
  - **Scientists** have their own blog to comment the work of their colleagues, described their recent findings, or keep a "diary"
- The **Blogosphere** is already influencing the world
- Scientists should be part of it, **so yes**, you should.
  - Excellent practice to write clearly, compellingly & effectively
  - Reanimate the scientific discussion (e.g. climate change)
  - Protect & defend your work (the world is accelerating…)
  - Blog are essential to a good career (direct contact with colleagues everywhere in the world, with scientific journalists)

Blogging: Is that really a hobby?





- Typical blogger spends 1h per day on his/her blog
- Work time? TV time?

What American do all day long. Source: Bureau of Labor Statistics
Credit: Lam Thuy Vo

Advice for Future Science Bloggers

Golden rules:

1. Choose a theme for your blog based on your interest, expertise and passion. Find a niche!
2. Don't write anything online (in your blog, in your tweet, in your commentaries, …) that you will not say in person

- **You want to be read**
  - Learn how to properly tag your posts to be found by search engines
  - Advertise your post with social media, create a network
  - Practice writing and read your colleague blogs
- **You want to have fun**
  - Work in group if possible
  - Don't be afraid to be funny, provocative, show your personality (see the SarcasticRover Twitter feed)
- **You want to learn**
  - Choose a good server (wordpress?) and learn how to configure it (templates)
  - Don't write only about your work or your daily life (think "big")
  - Use new technologies (video hangout, online tools)
- **What you write will remain and reveal you**
  - It may be easier to find a job as a science writer
  - Search committee members in universities & research institutes may read your blog

#ArsenicLife: The Actors

Scientists

Felisha Wolfe-Simon (FWS)
microbial geobiologist USGS
Role: leader of the team
Question: How flexible is life?

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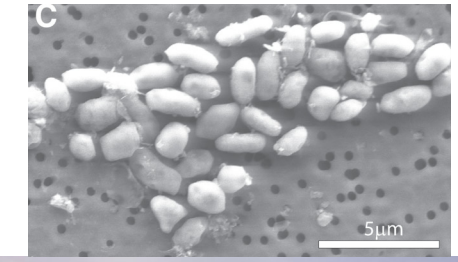
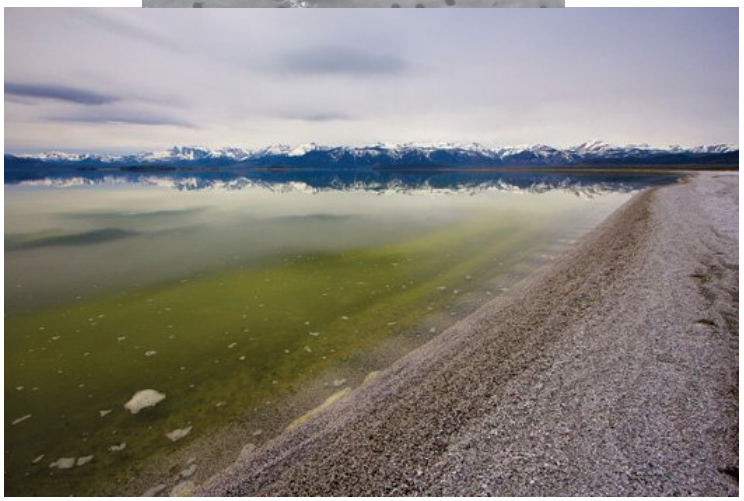
11 co-authors

The bacteria

GFAJ-1—"get Felisa a job.





Scientists

Prof.Rosie Redfield (RR)
Microbiologist at UBC
Role: Blogger & Scientist
Question: Is NASA right?

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The Blogosphere
Including other
blogger-scientists

Funding Institution

Scientific Journal

The Facts in the Eyes of Kronos

- In 2009 FWS got **a grant** from NASA Astrobiology Institute to study life in Mono Lake
- Field work in 2009 at Mono Lake to isolate a microbe called **GFAJ-1** ("Give Felisha A Job")
- Sample growth **experiment** by increasing the amount of Arsenic showed survival of GFA-1
- **Synchrotron measurements** show that As was chemically bound in the cells
- Science paper submitted and publish in Science Express in **November 2010**
- **Press conference** on December 2010 with Felisha, M. Voytek (NAI director), P. Conrad and the skeptical counterpoint (Steven Benner, a chemist)

Recipe for Disaster

- **NASA Press-release** with a hyped title "Alien Life Discovered on Earth"
- **Press-Conference fiasco**. FWS overly dramatic & "arrogant", no scientific explanations, no mention of previous works
- The Science paper was in fact conservatively written but no journalists cared to read it

"We've cracked open the door to what's possible for life elsewhere in the universe, what else might we find?"
FWS

"The definition of life has just expanded."
Ed Weiler, NASA-SMD Director

And the Saga Started…

RRResearch

Not your typical science blog, but an 'open science' research blog. Watch me fumbling my way towards understanding how and why bacteria take up DNA, and getting distracted by other cool questions.

- Prof Rosie Redfield (RR), microbiologist at the University of British Columbia and big fan of **open science**.
- She was **skeptical** since NASA records were not good (see the Martian meteorite in 1996.
- When RR wants to think something through, she blogs in her blog
- **RRResearch** Rosie Redfield described then criticized this work:
  - *Lots of flim-flam, but very little reliable information*.
  - *If this data was presented by a PhD student at their committee meeting, I'd send them back to the bench to do more cleanup and controls.*
  - *I don't know whether the authors are just bad scientists or whether they're unscrupulously pushing NASA's 'There's life in outer space!' agenda. I hesitate to blame the reviewers, as their objections are likely to have been overruled by Science's editors in their eagerness to score such a high-impact publication.*

Consequences and First Response

- RR blog post initiated a strong reaction in the blogosphere ("had been been tweeting up a storm" **#arseniclife**), in the scientific community, criticizing, arguing about the finding.

- Journalists quickly reported on the **controversy** (e.g C. Zimmer, Of arsenic and aliens: What the critics said)

- Ronald Romeland (USGS), **senior researcher & author** of the paper to the media (Carl Zimmer at Slate)

"We cannot indiscriminately wade into a media forum for debate at this time. If we are wrong, then other scientists should be motivated to reproduce our findings. If we are right (and I am strongly convinced that we are) our competitors will agree and help to advance our understanding of this phenomenon. I am eager for them to do so."

More Responses to the Critics

- Felisa Wolfe-Simon **declined to comment**, arguing that these negative remarks to the press *"do not represent the proper way to engage in a scientific discourse and we will not respond in this manner."*

- **NASA spokesperson** Dwayne *Brown "The agency didn't feel it appropriate to debate science using the media and bloggers. Discourse should occur in scientific publications."*

- FWS & NASA failed to understand that the world has changed and they could not simply ignore these criticisms

Bitter & Personal Attacks

- Microbiologist Jonathan Eisen of the University of California at Davis called the lack of response "absurd" and told Carl Zimmer from Slate, *"They carried out science by press release and press conference. They are now hypocritical if they say that the only response should be in the scientific literature."*

- Science writer Ed Yong's response to the latter in a post on Discover magazine's website: *"Felisa Wolfe-Simon wouldn't discuss her arsenic-life findings with the press, but she's happy to share keys to success with Glamour."*

Back to the scientific literature

Published Online December 2 2010
Science 3 June 2011:
Vol. 332 no. 6034 pp. 1163-1166
DOI: 10.1126/science.1197258

RESEARCH ARTICLE

A Bacterium That Can Grow by Using Arsenic Instead of Phosphorus

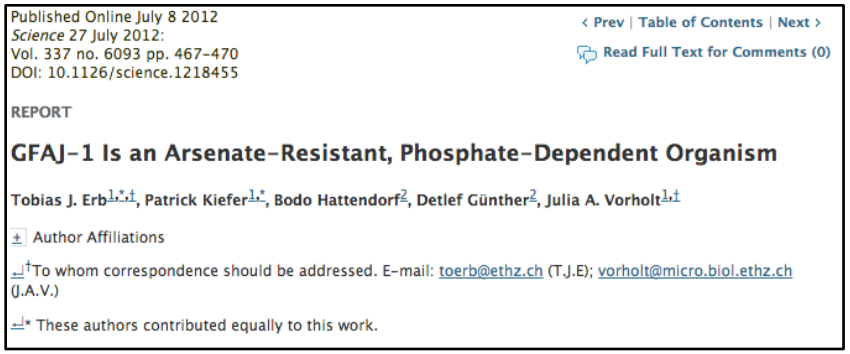
Felisa Wolfe-Simon[1,2,*], Jodi Switzer Blum[2], Thomas R. Kulp[2], Gwyneth W. Gordon[3], Shelley E. Hoeft[2], Jennifer Pett-Ridge[4], John F. Stolz[5], Samuel M. Webb[6], Peter K. Weber[4], Paul C. W. Davies[1,7], Ariel D. Anbar[1,3,8], and Ronald S. Oremland[2]

Author Affiliations

- Publication in the Science paper version in June 3 2011 with 8 formal critiques and technical responses
- The criticisms focused mostly on the possibility of contamination and on whether arsenate compounds would be stable enough to survive in the cells.
- 10 samples sent to other groups including Rosie Redfield lab.

From the Blogosphere to a New Paper in Science

- RR gathered a team of scientists who contacted through her blog ("teaming using a blog")
- Rosie Redfield posted regular blog updates throughout the experimental process ("open science")
- on August 2 "First evidence refuting Wolfe-Simon et al.'s results."
- Paper submitted to Science on Jan 31 2012 and posted on arXiv for comments ("violation of the Science embargo")
- Resubmitted after corrections (comments and responses are on her blog)
- Accepted for publication on June 1 (revised version posted on arXiv)
- Results presented in a talk at the Joint Congress of Evolutionary Biology on July 12
- Science posted TWO papers refuting the #arseniclife the same day
- **The end of the #arseniclife?**



Published Online July 8 2012
Science 27 July 2012:
Vol. 337 no. 6093 pp. 467–470
DOI: 10.1126/science.1218455

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Read Full Text for Comments (0)

REPORT

GFAJ-1 Is an Arsenate-Resistant, Phosphate-Dependent Organism

Tobias J. Erb[1,*,†], Patrick Kiefer[1,*], Bodo Hattendorf[2], Detlef Günther[2], Julia A. Vorholt[1,†]

± Author Affiliations

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↵* These authors contributed equally to this work.

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Science 27 July 2012:
Vol. 337 no. 6093 pp. 470–473
DOI: 10.1126/science.1219861

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Read Full Text for Comments (1)

REPORT

Absence of Detectable Arsenate in DNA from Arsenate-Grown GFAJ-1 Cells

Marshall Louis Reaves[1,2], Sunita Sinha[3], Joshua D. Rabinowitz[1,4], Leonid Kruglyak[1,5,6], Rosemary J. Redfield[3,*]

± Author Affiliations

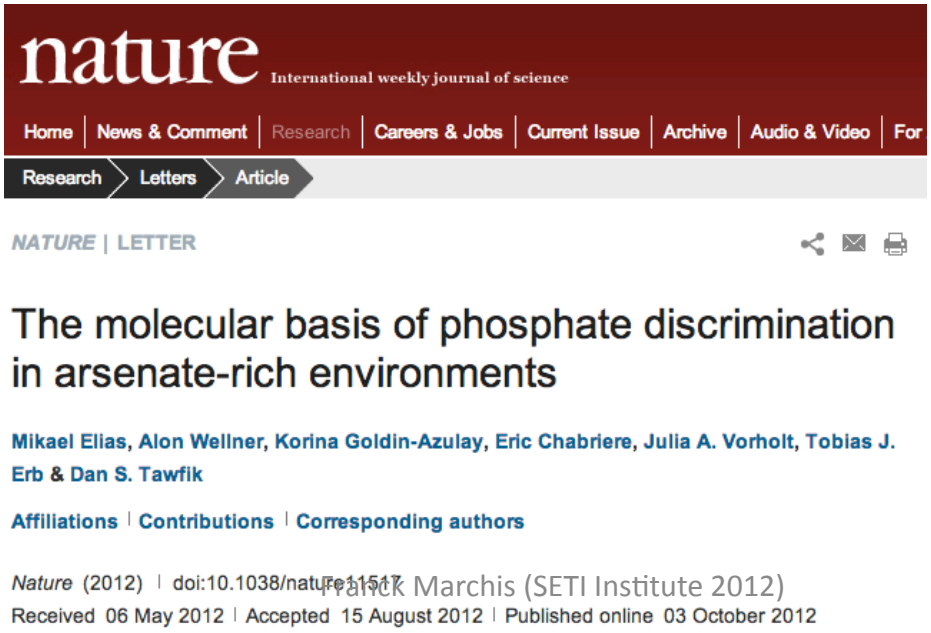
↵*To whom correspondence should be addressed. E-mail: redfield@zoology.ubc.ca

The Final Responses

- **RR paper**: fail to reproduce key FWS experiment (the growth of GFAJ-1 cells entirely without P)
- **Science Journal:** "*Contrary to an original report, the new research clearly shows that the bacterium, GFAJ-1, cannot substitute arsenic for phosphorus to survive,*"
- **FWS wrote**, "*There is nothing in the data of these new papers that contradicts our published data*," and added that her team continued to build on its original finding. (NYT). "*Busy finishing the research and preparing another paper.*"
- Reaction of Prof. J. Eisen blogger

The Second Ending

- **Publication in Nature**: How GFAJ-1 is well-adapted to picking out phosphates when they're scarce, surviving in a As/P x 3,000 times higher than found in the lake
- It is not ET but it may be useful…



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NATURE | LETTER

The molecular basis of phosphate discrimination in arsenate-rich environments

Mikael Elias, Alon Wellner, Korina Goldin-Azulay, Eric Chabriere, Julia A. Vorholt, Tobias J. Erb & Dan S. Tawfik

Affiliations | Contributions | Corresponding authors

Nature (2012) | doi:10.1038/nature11517

Received 06 May 2012 | Accepted 15 August 2012 | Published online 03 October 2012

Discussions

- **RR**: This is a story of **serial failure**. Lead author convinced of evidence without good research, senior authors didn't provide supervision. Co-authors should have accepted responsibility. Reviewers failed, missed a lot of problems. Science failed in selecting reviewers… and NASA failed big time. BUT the process of science did not fail.
- **My thoughts:** It took only 18 months to show the flaw in the finding (VS ALH84001 debate which is not yet settled 16 yrs later)
- **C. Zimmer** First time "the scientific community openly vetted a high-profile paper, and influenced how the public at large thought about it."

Discussions – Failures?

- **NASA** is a scientific agency whose funding depends on its scientific relevance. Can a scientific institution assume a media role?

D. Brown, NASA spokesman: "*The real issue is that the reporting world has changed because of the Internet/bloggers/social media. A 'buzz' term like ET will have anyone with a computer putting out anything they want or feel. NASA didn't hype anything—others did.*"

- **Science peer-review process**?

Editor (B. Albert) "*we need to create a process to ensure that the reviewers who provide their feedback to us on the manuscript are sufficient—in aggregate—to deal with all of its many different aspects*."

Consequences

- The #arseniclife revealed to the public that science is not always a **rational & civilized world**
- Social media & blogs speed up the **scientific debate**, humanize but may also polarize it
- FWS claimed to have been laid off from USGS. Did they sacrifice the pawn scientist?

Questions & Thoughts

"if you don't overstate your case, no one will listen!'

VS

"*Extraordinary claims require extraordinary evidence*" (C. Sagan)

and it is even more true in our modern world

- #ArsenicLife is the tutorial case of **overhyping science results** like the Mars meteorite, cold fusion, Faster than Light Neutrino and more to come (Mars Curiosity next week announcement).

- Criticizing in a blog the research from a peer-reviewed paper could be **detrimental to science** (see the climate change debate)

- Don't scientists have the **rights for failure**? Isn't it part of the scientific method to be disproved?

- There were **no ethical violations** here "If a paper is flawed, it should be dismissed. The scientist should not."

- **Arrogant behavior**? Are scientists ready to be catapulted in the world of fame?

- The **peer-review process** is terrible but the best we have. Blogging will not replace it but it helps enhancing the scientific debate.

Sources

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