

Ethics in Science

Henry H. Bauer

Introduction

"The scientific community must face the issue of scientific misconduct head on. It must work actively to prevent misconduct and not brush it under the rug when it occurs. These actions are urged by . . . the National Academy of Sciences . . . , the National Academy of Engineering, and the Institute of Medicine"

What brought that on? Such cases as this (2):

"A Michigan judge ordered the University of Michigan . . . to pay \$1.2 million in damages to a scientist after a jury found that her supervisor had stolen credit for her research and that the university had failed to investigate properly."

July 1993 (3): "**Misconduct cases include two chemists**: Leo A. Paquette, professor of chemistry at Ohio State University; and James H. Freisheim, former chairman of the Department of Biochemistry and Molecular Biology at the Medical College of Ohio . . . plagiarized grant applications the scientists had reviewed"

August 1993 (4): "Kekul \blacklozenge was a German supernationalist who invented the dream [about the ring structure of benzene, a snake biting its tail] so he wouldn't have to cite previous work . . . by researchers from Austria, France, and Scotland"

November 1993 (5): "**researchers often encounter scientific misconduct** - faculty and graduate students in four disciplines - including chemistry - . . . have encountered scientific misconduct and a variety of dubious research practices"

In 1993 Professor Harry Gibson gave colleagues in the Chemistry Department copies of his letter to a granting agency about a proposal he had been sent to review. He wrote, "Unfortunately, the proposal was plagiarized from my proposal of 1990".

Some years ago I had a letter from a friend in Australia who had discovered that one of his post-docs had been leaking results and research materials to a competitor overseas.

In his memoir *The Double Helix*, Nobel-Prize-winner J. D. Watson described getting data that its owner would not have wanted him to see.

William Lipscomb, 1976 Nobel-Prize-winner in chemistry, says that he "no longer put my most original ideas in my research proposals, which are read by many referees and officials. I hold

back anything that another investigator might hop on and carry out. When I was starting out, people respected each other's research more than they do today, and there was less stealing of ideas" (6).

Rustum Roy, Professor of Materials Science at Penn State, himself an outspoken critic of some corrupt practices in modern science, used a press conference to announce a new method for making synthetic diamond, and justified that as "the only way to prevent . . . a small group of peer reviewers . . . [having] an advance chance to duplicate the work in their labs" (7).

In X-ray crystallography, it had become routine to publish structures of complex substances without giving the raw data, so that others couldn't do proper checks or build on the work (8).

In the hurry to develop high-temperature superconductors (9) "scientific results were announced first in the press to gain a few days on other groups. . . . [One researcher] applied for a patent [and then] submitted a paper containing two systematic mistakes making it useless to any reader. . . . [and gave] a press conference . . . announcing - without giving any detail - the discovery Only . . . at the latest possible date, did he send his corrections to the journal".

I hope you agree that all this is unpleasant, sleazy, and shouldn't happen. But does it have anything to do with the actual science? Does it really matter, who gets the credit, so long as science keeps progressing?

I think it *does* matter - because science progresses with sound, reliable results *only to the degree that scientists are honest*.

Most people think science gives trustworthy results because of "the scientific method": testing ideas by experiment and so either proving or disproving them. Isn't that what you all do? Experiment, and find out what's true and what isn't?

But what if an experiment doesn't give the result you expected? What if it gives a result that you just *know* is wrong in some way? Don't you keep trying until you get the "right" result? Especially if you know that your boss is very sure that's what you should get? Isn't there the temptation to fudge a bit? Since you know what the right answer *ought* to be, why not just round the numbers off a bit?

	Ed Ergis, <i>Who Got Einstein's Office: Eccentricity and Genius at the the Institute for Advanced Study</i>
1988	Natalie Angier, <i>Natural Obsessions: The Search for the Oncogene</i>
	Sheldon Glashow (with Ben Bova), <i>Interactions: A Journey Through the Mind of a Particle Physicist and the Matter of This World</i>
	Jeff Goldberg, <i>Anatomy of a Scientific Discovery</i>
	Robert M. Hazen, <i>The Breakthrough: The Race for the Superconductor</i>
	Charles E. Levinthal, <i>Messengers of Paradise: Opiates and the Brian</i>
	Bruce Schechter, <i>The Path of No Resistance: The Story of the Revolution in Superconductivity</i>
1989	Solomon H. Snyder, <i>Brainstorming: The Science and Politics of Opiate Research</i>
	Robert Teitelman, <i>Gene Dreams: Wall Street, Academia, and the Rise of Biotechnology</i>

Henry H. Bauer

Professor of Chemistry & Science Studies

Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0227

hhbauer@vt.edu, (540) 951-2107, <http://www.cis.vt.edu/stshome/faculty/bauer.htm>

References

1. Pamela Zurer, "Academies urge action on scientific misconduct", *Chemical & Engineering News*, 14 February 1994, p.6; see also Christopher Anderson, "Academy warns against slipping ethics", *Science*, 11 February 1994, 263: 747.
2. Philip J. Hilts, "Scholar who sued wins \$1.2 million", *New York Times*, 22 September 1993, p.A23.
3. Pamela Zurer, "Misconduct cases include two chemists", *Chemical & Engineering News*, 12 July 1993, p.22.
4. Stu Borman, "19th-century chemist Kekulé charged with scientific misconduct", *Chemical & Engineering News*, 23 August 1993, pp. 20-21.
5. Pamela S. Zurer, "Survey finds researchers often encounter scientific misconduct", *Chemical & Engineering News*, 22 November 1993, pp. 24-25.
6. Quoted in M. W. Browne, "Nobel fever: the price of rivalry", *New York Times*, 17 October 1989, pp. C1,14.[filed under Mellican in SCIENCE]
7. Stu Borman, "Solid-state process produces synthetic diamond", *Chemical & Engineering News*, 26 October 1992, 5.

8. Marcia Barinaga, "The missing crystallography data", *Science*, 245 (1989) 1179-81.
9. Ulrike Felt & Helga Nowotny, "Striking gold in the 1990s: the discovery of high-temperature superconductivity and its impact on the science system", *Science, Technology & Human Values*, 17 (1992) 506-31.
10. John Ziman, *Public Knowledge*, Cambridge: Cambridge University Press, 1968, 120.
11. Jesse Dobson, cited in Richard Stone, "ScienceScope", *Science*, 259 (1993) 751.
12. *Chemical & Engineering News*, 8 January 1990, 4.
13. *Science*, 247 (12 January 1990) 154.
14. *Science*, 1 December 1989, 1177.
15. *Chemical & Engineering News*, 27 October 1989, 42.
16. *Chemical & Engineering News*, 15 March 1982, 12.
17. Thomas Gilovich, *How We Know What Isn't So*, New York: Free Press, 1991.
18. *Science*, 247 (12 January 1990) 155.