

Notes on a scientific scandal



**Plastic Fantastic:
How the Biggest
Fraud in Physics
Shook the
Scientific World**

by Eugenie Samuel Reich

PALGRAVE MACMILLAN:
2009. 272 PP. £15.00;
\$26.95 HARDBACK

Sometime in 1999, when I was editor of *Physics World* magazine, I commissioned Bertram Batlogg, then based at the world-famous Bell Laboratories in Murray Hill, New Jersey, to write an article on cuprate superconductors. As I recall, a first draft arrived a few months later, and I replied with some queries and suggestions. I also recall that it took much longer than usual for the second draft to be delivered, but it must have arrived towards the end of 1999 because the article was published in the February 2000 issue of the magazine.

Flicking through the 13 January 2000 issue of *Nature*, as Batlogg's article would have been going to press, I saw a news story that seemed to explain the delay: patent judges had decided that Batlogg and co-workers at Bell Labs should be granted US patent rights for a widely used high-temperature superconductor discovered over a decade earlier. However, other possible explanations for the delay started to arrive thick and fast in high-profile journals: two weeks later *Nature* contained a paper by Batlogg and three others — Jan Hendrik Schön, Christian Kloc and Ernst Bucher — on organic photovoltaic diodes, quickly followed by a paper on organic field-effect transistors (by Schön, Steffen Berg, Kloc and Batlogg) in *Science*.

In 2000 alone, the Schön-Kloc-Batlogg juggernaut published a total of eight papers in *Nature* and *Science* on various devices made from organic crystals, on superconducting devices based on carbon-60 molecules, and on fundamental physics such as the fractional quantum Hall effect. I was tempted to ask Batlogg and his co-workers to write another feature article on all this work but decided they would be too busy. Instead I asked a freelance to write a news story about this explosion of creativity and productivity. This article focused mostly on Batlogg (then one of the five most-cited physicists in the world), who said that Kloc grew crystals of the

“highest quality” and that Schön (a relatively unknown researcher at the time) had “an excellent background in semiconductor physics and photovoltaics” (*Physics World* 14, 9; January 2001).

Batlogg moved to ETH Zurich in Switzerland around this time but Schön continued to pump out the papers with a variety of new co-workers until, in May 2002, the wheels came off. Bell Labs announced that it had set up a committee chaired by Malcolm Beasley of Stanford University to investigate if scientific misconduct had occurred. The committee's report, released on 25 September 2002, found Schön guilty on 16 out of 24 charges of misconduct, and he was fired on the same day. His offences included “manipulation and misrepresentation of data”, notably “the substitutions of single curves or even parts of single curves, in multiple figures representing different materials or devices, and the use of mathematical functions to represent real data”. It also emerged that “none of the most significant physical results was witnessed by any coauthor or other colleague”, sometimes because they had been performed (if that is the right word) by Schön back in Konstanz, rather than at Bell Labs.

All of Schön's coauthors — including Batlogg and Kloc — were cleared of misconduct, and were also found to “have, in the main, met their responsibilities [as coauthors]”. However, the committee mostly skirted around the issue of author responsibility, apart from rhetorically asking if Batlogg “took a sufficiently critical stance with regard to the research in question” — to which he replied, in an appendix to the report, that he had (see page 331 for more on author responsibility). Seven papers in *Nature* and eight in *Science* were later retracted.

The Beasley committee's report is one of the most remarkable documents I have ever read, and I am pleased to report that this book by the science journalist Eugenie Samuel Reich does a magnificent job of going behind the necessarily measured language of the official report and investigating what may well be the lowest point in the history of physics. This is not a given: a BBC television programme about the affair *The Dark Secret of Hendrik Schön* is one of the worst documentaries I have ever seen. (In the interests of transparency I should also point out that the publishers of *Nature Nanotechnology* and the publishers of the

book under review are owned by the same company, MacMillan.)

Reich has interviewed more than 100 people involved in the story, and also seen a large number of e-mails from the time, including a number of referee reports on Schön's papers (although the journals involved did not hand over their files to the Beasley committee). And while it is a pity that she did not manage to interview Schön himself, the book does not suffer as a result. The picture of Schön that emerges is not of someone confident or arrogant, as one might expect, but of a harmless almost hapless character who seems unembarrassed by his inability to answer many of the questions put to him by colleagues and other people in the field, preferring instead to belatedly respond to criticisms and suggestions by conjuring up another ground-breaking paper a week or two later, often by working backwards from what he felt the result should be.

The book's real strength is the way it uses a journalistic approach to document what was happening on a week-by-week basis at Bell Labs (a legendary lab with a string of Nobel prizes, now presided over by an ever-changing cast of managers and owned by a company beset by the dot com crash and looking for the next big technological breakthrough to revive its fortunes), as well as the editorial offices of high-profile journals (for whom chapter 6 will make uncomfortable reading) and other laboratories (UC Berkeley, Minnesota, Delft and elsewhere) trying to produce the results. In doing so Reich uncovers a wealth of detail — especially early concerns about Schön's work raised by colleagues at Bell Labs, notably suspicions by Don Monroe (who was later a member of the Beasley committee) that Schön managed to rebut by fabricating even more data, and a complicated trail that started with Julia Hsu, Lynn Loo and Bob Willett at Bell Labs and, via Lydia Sohn at Princeton, ended with Paul McEuen of Cornell informing the management at Bell Labs and various journals, thus prompting the official investigation — that has not been published before. There are probably still more secrets under lock-and-key at Murray Hill and elsewhere, but for now Reich's engrossing book will be the last word on the matter. □

REVIEWED BY PETER RODGERS

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