

BOOK REVIEW

Bad Science: Quacks, Hacks, and Big Pharma Flacks by Ben Goldacre. Faber & Faber, 2010. 304 pp. \$15 (paperback). ISBN 978-0865479180. [First published in 2008 in the UK by 4th Estate]

Ben Goldacre is a British celebrity, columnist in *The Guardian*, non-practicing MD, whose *Bad Science* sold 400,000 copies (Goldacre 2013). I had heard of him some years ago because he had committed a culpably misinformed column about the HIV/AIDS dissident Christine Maggiore (Bauer 2009). I expected only the same from his book, but was very pleasantly surprised: I urge others to read it for its sound discussions of how the media's coverage of science is generally misleading; how misleading, too, is the way in which statistics are disseminated by drug companies and the media; and how the drug companies are not to be trusted. And there are some other interesting tidbits as well:

- Goldacre is spot on about the mess that the media make of covering scientific matters, and how disastrous is the ignorance of those in power (Chapter 11: How the Media Promote the Public Misunderstanding of Science). He cites a dictionary word, *churnalism*, credited to journalist Nick Davies and referring to the uncritical rehashing of press releases as news (*dictionary* was coined by Jack Good to characterize a new word worthy of being in a dictionary; another worthy is *tritto*, repetitions beyond *ditto*).
- Chapter 12, Bad Stats, is generally sound and informative about how statistics can be misused and misrepresented, though the presentation has some loose ends. I don't agree, for example, that "natural frequencies" are the *only* sensible way to communicate risk, though I agree that they should always be included. I would also have liked prime emphasis on correlation never proving causation and high probability never equaling certainty.
- The book acknowledges that serious flaws in clinical trials are quite common (pp. 44–45).
- The drug companies are properly given short shrift, e.g., p. 184 ff.
- Highly informative and with specific detail is the discussion of how clinical trials can be deliberately biased to favor drug approval, and the description of other flaws in the process (pp. 189–206).

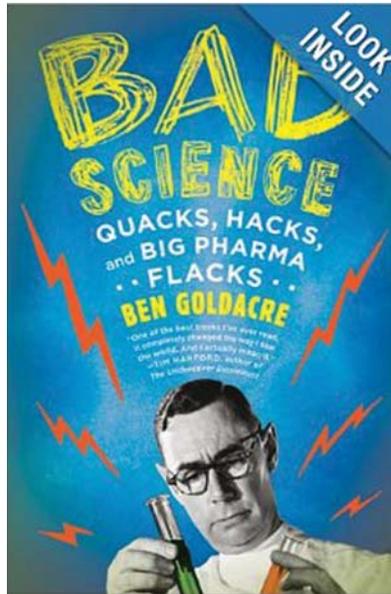
- The detailed debunking of British charlatans, though directly pertinent only for British readers, are well worth reading because similar situations with similar characteristics are present on this side of the Atlantic.
- There are interesting tidbits of information about early German research into smoking and lung cancer (footnote, p. 218) and data indicating that episodes of fear of vaccination have been regional.

On the negative side:

- Goldacre appears to believe that mainstream medicine should be respected as evidence-based (pp. x, 316), when most of it isn't. Later he cites anecdotal evidence that 50%–80% of treatment *decisions* are evidence-based, but only 13% of the *treatments themselves* are evidence-based with another 21% “likely to be beneficial” (p. 182). In other words, doctors who base decisions on the evidence available to them from drug companies and official agencies are, about half the time, relying on unsound evidence. Throughout, the book insinuates that mainstream medicine can be trusted even when admitting that it often cannot be, e.g., at p. 99 when referring to the Cochrane Collaboration. In this vein, Goldacre misleads about John Ioannidis's work (p. 219), implying that it reveals the unreliability of brand-new studies. But Ioannidis has actually shown (Ioannidis 2005, Ioannidis & Panagiotou 2011) that *long accepted* mainstream treatments are based on flawed initial trials done under auspices of drug companies.
- Goldacre is too blithely dismissive of the harm done to “a very small number of people” by any medical intervention or “any human activity” (p. 298). “Whenever we take a child to be vaccinated,” Dr. Goldacre writes, “we're aware that we are striking a balance between benefit and harm, as with any medical intervention” (p. 313). Nonsense. “We” may include statisticians and researchers and pundits like Goldacre, but most patients simply have to trust the recommendations made by doctors—particularly when the patients have no choice but to sign the “informed consent” forms if they want to be treated at all. We—the non-experts—just hope that our trust is warranted, we don't balance benefits against risks. Goldacre may not understand this because he doesn't himself take patients (Goldacre 2013).
- A pervasive strand of Goldacre's bravado is denigration of “humanities graduates” by contrast to scientists, among whom he

seems, wrongly, to include doctors (see for example Bauer 2008). The book's title should really be "Bad Medicine," not *Bad Science*.

- The book implies that glucosamine can do nothing against arthritis (p. 155). A judicious evidence-based assessment says otherwise (O'Mathuna & Larimore 2001).
- Goldacre is quite wrong about HIV/AIDS (p. 88) when even common sense ought to have warned him: If Botswana really has a 48% prevalence of what's supposedly a fatal disease, the country ought to have been depopulated long ago. Antiretrovirals are described as life-saving (p. 184), but they are the opposite (Bauer 2011).
- Goldacre denigrates Linus Pauling for cherry-picking (p. 98)—the Pauling who is widely regarded as the greatest chemist of the 20th century, the founder of molecular biology, winner of two Nobel Prizes, who urged the importance of dietary anti-oxidants (and was maligned for doing so) long before it became the conventional wisdom. This is only one example of Goldacre's outsized ego, hubris, self-confidence, and inability to see himself as others see him. The book's style may turn some people off for this reason; Goldacre is just too full of himself.



On several points, I'm not sure how sound the coverage is:

- Goldacre parrots the mainstream condemnation of Andrew Wakefield who warned that simultaneous multiple vaccinations might be a cause of autism. I've read only enough about this affair to conclude that legitimate questions remain. Goldacre notes the irony that there is a definite correlation between maternal rubella infection while pregnant and autism in the later-born child; but surely this makes plausible Wakefield's belief that exposure to rubella vaccine at an early age might act similarly? In some babies at least?

Since most or all vaccines harm *a few* individuals, surely it is always worth keeping a mind open and studying possible reasons for that, looking for characteristics that might identify people particularly likely to react badly to a specific vaccine.

- David Horrobin is described as marketing by dubious means remedies that turned out to be ineffective (p. 157 ff.). The details Goldacre presents seem sound, but he does not charge Horrobin with actual deceit. This unfavorable picture does not jibe with the David Horrobin who founded *Medical Hypotheses* and published sensible articles about peer review and the like, as well as the fascinating book *The Madness of Adam and Eve* (Horrobin 2002).

Bad Science and the many columns Goldacre has written illustrate two absolute truths:

1. There are no general principles or guidelines that can serve as shortcuts for deciding whether any given controversial claim is worth attending to. There is no sound way to pronounce something “good science” or “bad science” without digging comprehensively into the evidence and the arguments pro and con (Bauer 2001).
2. Any given individual or book can be sound on some general matters and in some specific instances and yet quite wrong about other instances and generalities. The degree to which Goldacre is sound on any given point correlates with the amount of detail with which he is familiar.

Quite generally, compendia of “pseudo-science” are likely to be wrong about some of the topics, because the compilers of such lists simply haven’t had the time to look in sufficient detail at all the topics they cover. Recent examples include science journalist Specter’s *Denialism* (2009), which is uninformed and wrong about HIV/AIDS among other things. A much better book is physicist Friedlander’s *At the Fringes of Science* (1995), but it remains uninformed and wrong about UFOs and cold fusion, for instance. Shermer’s *Why People Believe Weird Things: Pseudoscience, Superstition, and Other Confusions of Our Time*, too, is good about some topics and biased on others. Various older compendia and debunkings of supposed pseudo-science are cited in *Science or Pseudoscience: Magnetic Healing, Psychic Phenomena, and Other Heterodoxies* (Bauer 2001). The mid-20th century classic in this genre is Martin Gardner’s *Fads and Fallacies in the Name of Science* (1952/1957). It is detailed and instructive about some outlandish claims but wrong on others, for example by failing to mention that chiropractic and osteopathy have overcome their cranky birth in one

person's hunch and developed into pragmatically useful healing techniques, superior to mainstream medicine in handling lower-back pain, for example.

All compendia have one thing in common: The authorial claims to base judgments on general principles or assessment of specific evidence are rationalizations; what is labeled as sound is what happened—for whatever reason—to strike the author as sound, and anything the author finds unbelievable—for whatever reason—is labeled pseudo-science. Readers have this choice: Accept the author's personal opinions, or dig into the evidence for themselves and arrive at an informed opinions.

Caveat lector.

HENRY H. BAUER

Professor Emeritus of Chemistry & Science Studies, Dean Emeritus of Arts & Sciences
Virginia Polytechnic Institute & State University
hhbauer@vt.edu, www.henryhbauer.homestead.com

References

- Bauer, H. H. (2001). *Science or Pseudoscience: Magnetic Healing, Psychic Phenomena, and Other Heterodoxies*. University of Illinois Press.
- Bauer, H. H. (2008). Doctors Aren't Scientists, and Medicine Isn't Science. <http://wp.me/p8Qhq-6X>
- Bauer, H. H. (2009). Scientifically Illiterate Science Pundit: Ben Goldacre. <http://is.gd/eewMuc>
- Bauer, H. H. (2011). HAART Is Toxic: Mainstream Concedes It, in Backhanded Ways. <http://wp.me/p8Qhq-uR>
- Goldacre, B. (2013). <http://www.badscience.net/about-dr-ben-goldacre>
- Horrobin, D. (2002). *The Madness of Adam and Eve: How Schizophrenia Shaped Humanity*. Bantam. [Reviewed in *Journal of Scientific Exploration*, 15, 571–73]
- Ioannidis, J. P. A. (2005). Why most published research findings are false. *PLoS Medicine*, 2(8), e124.
- Ioannidis, J. P. A., & Panagiotou, O. A. (2011). Comparison of effect sizes associated with biomarkers reported in highly cited individual articles and in subsequent meta-analyses, *JAMA*, 305, 2200–2210.
- O'Mathuna, D., & Larimore, W. (2001). *Alternative Medicine—The Christian Handbook*. Zondervan. [Although several early chapters are addressed specifically to Christians, the assessments of specific, claimed remedies are entirely empirical and evidence-based; see review in *Journal of Scientific Exploration*, 16(2002), 164.]