

# The power of words

Are books in the realm of science influential enough to affect or (mis)inform public opinion?

From the book burnings of the Qin Dynasty in pre-Christian China to the Roman Catholic Church's *Index Librorum Prohibitorum* (List of Prohibited Books) to the literary *Säuberung* in Nazi Germany, humans have long understood that books—or rather the information therein—can be hugely influential. Famous works such as Charles Darwin's (1809–1882) *The Origin of Species* (1859), Karl Marx's (1818–1883) *Das Kapital* (1867) or Rachel Carson's (1907–1964) *Silent Spring* (1962) have helped to trigger social revolutions, turn belief systems on their head and deliver the truth to a public otherwise kept in the dark.

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Books certainly reach a much larger audience than most scientific journals and thus have a greater potential to shape or influence public opinion. More pragmatically, non-fiction books are not only a way of disseminating information, but also an outlet for personal viewpoints or ideas. It can therefore be difficult for the reader—expert or otherwise—to separate facts from opinion. Given that anyone is free to write a book—so long as they can find a publisher—can or should the public trust in books based on and around science?

Books have undoubtedly helped to shape modern science and the public's opinion of it. In 2006, the editors of *Discover Magazine*—a popular general science title—published a list of what they felt were the 25 'greatest' scientific books of all time (Anon, 2006). At the top of the list were *The Voyage of the Beagle* (1845) and *The Origin of Species* by Charles Darwin. Lee Silver, a professor of molecular biology at Princeton University (NJ, USA), was

quoted in the article: "Darwin revolutionized our understanding of life, the relationship of humanity to all creatures in the world, and the mythological foundation of all religions" (Anon, 2006). The controversy surrounding Darwin's grand theory has not ended since: *The Origin of Species* also made it into the 'honorable mention' section of the 'Ten Most Harmful Books of the 19th and 20th Centuries' book list, published by the conservative magazine *Human Events* (Washington, DC, USA; Anon, 2005).

However, unlike Darwin's works, many books are not that influential. "[Books] are more significant for reinforcing previously held beliefs, rather than winning new converts," commented Dan Fagin, Director of the Science, Health and Environmental Reporting Program at New York University (NY, USA), who is also a science journalist and book author. "But it's very hard to generalize because there are certainly lots of exceptions." One such exception is *Silent Spring*, written by marine biologist Rachel Carson, which is widely credited with having begun the modern environmental movement. It brought environmental concerns directly to the American public—specifically, that the uncontrolled use of pesticides was killing animals, particularly birds, and humans—and helped to persuade the US Government to re-assess its agricultural and environmental policy. "*Silent Spring* was pilloried in its day," Fagin said. "Not because its science was so penetrating and its writing was so lyrical, but because it was very early to some very important ideas."

Both *Silent Spring* and *The Origin of Species* were based on scientific research and honest endeavour, so why would anyone think them harmful? Darwin, in particular, was careful not to become embroiled in the religious and political debates that surrounded his work. Ursula Goodenough, Professor of Biology at Washington University in St Louis (MO, USA) and author of the *The Sacred Depths of Nature* (1998), points to the problem: "Most of the debates of late have not, of

course, been about the science content of the best sellers, but rather about their non-science content." Goodenough's own book has been described as forging a new type of religious naturalism. "The motivation was to write the most accurate science I could come up with," she explained, "and couple that to my understanding of non-theistic sensibilities, thereby providing the reader with paths for such engagement." *Sacred Depths* is scientific in its explanations of evolutionary theory and other scientific topics, and Goodenough's thesis—that these natural phenomena inspire spiritual feeling and can act as the basis for a 'global ethos'—is carefully separated from the scientific descriptions.

However, not all authors are this careful. "The important thing is that when scientists speak outside the scientific realm, then they should label it that way," Fagin said. "They should make it clear in their writing that they're going beyond the bounds of testable hypotheses and are leaving the empirical world. I think they have the right to do that, but I do think that it's important for scientists to say so when they do."

This explains, for example, the controversy around Michael Behe's books. Behe is Professor of Biochemistry at Lehigh University (Bethlehem, PA, USA) and the author of *Darwin's Black Box: The Biochemical Challenge to Evolution* (1996), in which he uses scientific arguments to undermine evolutionary theory. In a review published in *Nature*, Jerry Coyne, Professor of Biology at the University of Chicago (IL, USA), noted that although "[Behe's] intended audience of lay readers may be impressed by the elaborate descriptions of molecular biology and long lists of references, [his] 'scientific' alternative to evolution ultimately becomes a confusing and untestable farrago of contradictory ideas" (Coyne, 1996).

Although the scientific community at large dismisses Behe's writings, millions of lay readers are unequipped to do so, and instead respond enthusiastically to Behe's claims because his book reinforces their own beliefs. As Fagin noted: "It's a piece of ammunition that [those who agree with it] can deploy if [they] feel the same way because they can cite a so-called expert who agrees. Commercially, that is a very powerful formula."

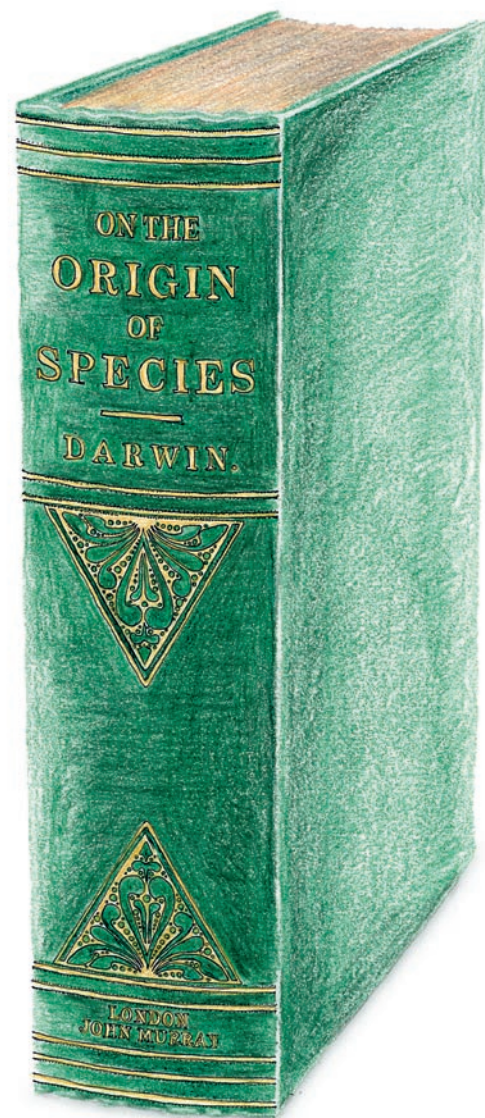
As the evolutionary biologist Richard Dawkins noted in his *New York Times* review of Behe's latest book, *The Edge of*

*Evolution, The Search for the Limits of Darwinism* (2007), "[Behe] has bypassed the peer-review procedure altogether, gone over the heads of the scientists he once aspired to number among his peers, and appealed directly to a public that—as he and his publisher know—is not qualified to rumble him" (Dawkins, 2007).

Dawkins, who has just retired from the chair of the Public Understanding of Science at the University of Oxford in the UK, spent his early book-writing career explaining complex scientific topics. His first book, *The Selfish Gene*, published in 1976, was released to wide scientific acclaim and has sold more than one million copies. Since then, Dawkins has gone beyond popularizing science and now uses his 2006 book, *The God Delusion*, to criticize religion; the reviews, even from scientists, have not always been positive. H. Allen Orr, Professor of Biology at the University of Rochester (NY, USA), noted in his review that *The God Delusion* "is not itself a work of either evolutionary biology in particular or science in general. [...] It's just Dawkins talking" (Orr, 2007).

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Fagin does not believe that straying from scientific topics is a problem, so long as the authors acknowledge they have done so. "The strength of science is that individual scientists make their own decisions about what to examine," he said. "[Dawkins] burns with a need to address these questions [about the existence of God] and he addresses them in a very interesting and very useful way, whether you agree with him or not." However, Fagin was careful to distinguish between Dawkins and Behe. "I think that Dawkins is usually pretty careful to note when he is speaking within the boundaries of science and when he isn't. What I object to with Michael Behe is that he insists that his ideas are scientific when they are not. [...] My feeling is that he should express his ideas in a way that makes it clear that they are outside the realm of science, though perhaps worth discussing as matters of philosophy or faith."



Goodenough also sees no problem with scientists straying from pure science, but noted that this does not excuse inaccuracy. "I would say that if a scientist wishes to cover a topic, be it politics, religion, or something not in their field, that they have an obligation to become deeply informed in the non-field topic and give the draft manuscript to experts for vetting. In *Sacred Depths*, for example, a number of religious scholars read drafts and provided critical critique. I would never have considered publishing it without that input."

Yet, unlike scientific journals, book publishers do not usually fact-check and peer-review manuscripts—scientific or otherwise. "Publishers don't, in the main, appear to be particularly concerned about scientific accuracy," Fagin commented. "What they're really worried about are legal issues. They want to be sure that the writer isn't making things

up or committing libel. Few publishers will invest the time and resources to rigorously fact-check science books."

Of course, evolution and religion are not the only topics in which books have become an important avenue of expressing one's opinion. John Gray, author of *Men are from Mars, Women are from Venus*, has sold more than 40 million copies of his book since its first publication in 1992, and has focused on helping "men and women understand, respect and appreciate their differences in both personal and professional relationships," according to his website. However, not everyone agrees with his ideas. Janet Hyde, Professor of Psychology and Women's Studies at the University of California, Berkeley in the USA, criticized authors such as Gray for reinforcing gender stereotypes: "[I]t becomes obvious how ludicrous these hypotheses are, but they pervade our cultures," she said at the European Molecular Biology Organization's (EMBO; Heidelberg, Germany) 'Women in Science: The Way Forward' conference in 2007. "[A]ll these stereotypes about enormous gender differences in psychological characteristics and ability are just not well founded in the scientific data" (Hyde, 2005).

Yet, Gray's theory—that significant, intrinsic differences between men and women lead to real communication and relationship problems—speaks to large numbers of people, notwithstanding the fact that many experts disagree with his position. But, perhaps this is the symptom that Fagin highlighted: "Books are very influential in particular sub-cultures or groups of people who share the opinions of the authors; they're really great for reinforcing your prior beliefs."

Despite the vast array of conflicting or misleading opinion and comment on science in popular books, we should at least be sure that children's textbooks are grounded in scientific fact. However, textbooks have also become an important arena for interested parties to impose their beliefs on students. On 20 December 2005, the proponents of intelligent design (ID) were handed a serious defeat in their attempt to influence science curricula. In the landmark *Kitzmiller vs Dover Area School District* (2005) verdict,

Judge John E. Jones III ruled that: "The overwhelming evidence at trial established that ID is a religious view [...] and not a scientific theory."

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However, ID supporters continue to pursue its introduction into science classes in US schools. The latest battleground is the state of Texas, an important consumer of school textbooks, with an overtly religious and conservative board of education. The Board, led by the dentist and devout Christian Don McLeroy, is wrangling over the requirement of the state for textbooks to present the "strengths and weaknesses" of scientific theories. McLeroy is adamant that the weaknesses of evolutionary theory—and presumably, therefore, the strengths of ID—require greater coverage in the textbooks used by the state's schools. "You've got a creationist system and a naturalist system [of science], [...] I just don't think [that evolution is] true or it's ever happened," McLeroy told the *New York Times* (Beil, 2008), although the article notes that he was careful to frame his opinion as non-religious.

It is this apparently unscientific agenda that has Texan scientists worried; in response, they have collectively launched the 21st Century Science Coalition ([www.texasscientists.org](http://www.texasscientists.org)). In a statement at a press conference held on 30 September 2008, David Hillis, Professor in the Section of Integrative Biology at the University of Texas (Austin, TX, USA), said: "It is clear that Chairman McLeroy wants to promote a particular religious, rather than a scientific, agenda in our science classrooms, and that has stimulated our group of over 800 Texas scientists to object" (statement retrieved from website 13 October 2008).

Yet Fagin is cautious about the scientific community taking collective action. His feeling is that the dangers of censorship and of stifling unpopular ideas that come when scientists declare some books as 'good' and others as 'bad' outweigh

the risk of allowing bad science to reach the public. That is especially true, he added, because most books merely reinforce prior opinion: "You don't really see people picking up books unless they're already very familiar with the author, or understand what the author is saying, or believe what the author is saying," he said. Indeed, the Internet is now fulfilling a similar purpose, and is providing it much faster than books ever could. "[T]he web provides the same sort of outlet for this legitimacy-seeking that books have provided," Fagin said. "On the web you can always find someone who thinks that your idea is legitimate, no matter what it is."

Debate is certainly an important part of the scientific method, and the dialogue that books allow, however limited or erroneous it might be, remains a valid contribution. As Fagin noted: "One of the great strengths of science is its diversity and that it speaks with many voices."

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doi:10.1038/embor.2008.219