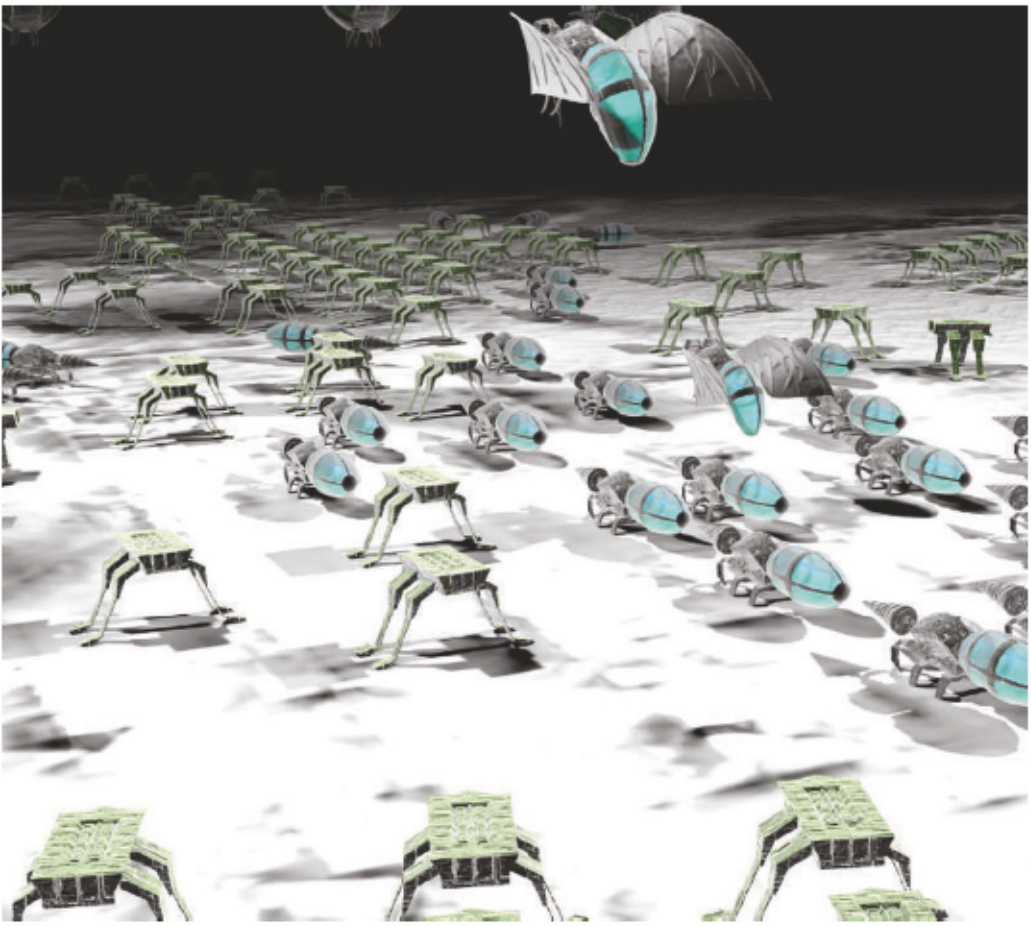

C. DARKIN/ALAMY

Never mind the hype: weighing up nanotechnology requires an understanding of why people are afraid.

A little judgement

Nano-Hype: The Truth Behind the Nanotechnology Buzz
by David M. Berube
Prometheus: 2005. 300 pp. $28

Harry Collins

Major technologies are born into a febrile world these days, with everyone wanting a piece of the action. Where projects are so large that the costs fall on wide sectors of society, the decision-makers are rarely technical experts. Giving an idea a sexy label attracts the attention of the powerful, irrespective of its technical merit or real promise. Consider the billions that were poured into the 'third generation' of intelligent computers, the space race and the search for a 'magic bullet' for cancer.

Nowadays, the public, led by pressure groups and represented by politicians, believe that they too have a right to a say regarding the implications of a new technology, especially with respect to its dangers and its impact on the world. It is a claim that has been hard to deny ever since it became clear that the "power too cheap to meter", promised after the Second World War, was a bluff. Genetic engineering and the combined measles, mumps and rubella (MMR) vaccine have paid the price. But what about nanotechnology, another player in this game? Should we be optimistic about its potential, or is pursuing it an obvious mistake? This is the question posed by David Berube in his book *Nano-Hype*.

In practice, it is often difficult to see how to make such a judgement about the value of a technology independent of the overblown optimism and overly dramatized foreboding. Sometimes, though, it is relatively easy. The fuss over the MMR vaccine, for example, should never even have started because there was no scientific controversy — there was no evidence at all that MMR was dangerous, even though the newspapers failed to grasp the point. On the other hand, in the 1950s the UK media sang the praises of Britain's first nuclear power station, Calder Hall, but it was scandalous that it took so long for it to be understood that the cost of decommissioning nuclear plants should be included in the price of the power. These cases are rare because they are so clear cut; there are usually pretty good arguments on both sides.

One way to make progress in difficult cases would be to analyse the mechanisms that amplify the arguments on either side of the debate. Perhaps this would make it possible to discount some of the fuss, even if it wouldn't necessarily yield a neat resolution. How do the advertising campaigns and the associated moral panics work? Who pumps them up and why? What are the roles of the money-hungry researchers and their institutions, and the media? To find out how positive and negative hype works, you have to look at detailed case studies of specific incidents and comparative analysis of the many well known episodes.

Unfortunately, Berube's book does not take this approach. The author makes the mistake of thinking that a sufficiently exhaustive look at every word that has ever been written about nanotechnology will reveal something. But science is an oral culture. Although science's spokespersons rattle on endlessly about peer review, the vast majority of published papers, peer reviewed or not, are largely ignored by scientists in the field. The problem that would face an alien from another planet who wanted to make a digest of terrestrial science from the literature alone would be about as bad as that facing a lay person who tries to understand it by reading everything on the Internet.

To know what counts as reliable science you need to have the written word sifted by someone who knows how to sift it — someone who is embedded in the oral culture that selects and condenses those scientific contributions that are of lasting importance. There is usually more than one way to do the selection, and this is why experts disagree, but without any sifting there is nothing of substance to argue about. To sort out the material that contributes to a scientific controversy, then, one must either be a scientist or spend a long time talking to the specialists and pulling out the major themes around which disagreements and misunderstandings turn.

Berube has instead produced a long, closely printed and almost unreadable text that quotes from a huge range of sources, primary and secondary, with no winnowing with respect to value. It is organized on the principle of a list, rather than on the explanatory hypotheses. Interspersed in the text are some disconnected musings. To give one example, here is Berube's 'explanation' of why Richard Feynman became interested in nanotechnology: "What led to Feynman's lectures on microtechnology? According to [Freeman] Dyson, Feynman struggled 'to understand the workings of nature by rebuilding physics from the bottom up.' Hence, it might not be much of a stretch for Feynman to transpose his bottom-up view of the discipline of physics to fabrication strategies of the very small." There is not much one can do with this kind of thing.

But because the referencing is so dense, at least the book provides a useful pointer to the available secondary source material on nanotechnology. ■

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