

charges in his topical, well-publicized and widely discussed volume *Don't Worry [It's Safe to Eat]*.

The scientific and political histories of genetically modified (GM) foods provide many of the illustrations of the book's main themes, although Rowell claims that the book is not anti-GM. He also uses mad-cow disease (bovine spongiform encephalopathy, or BSE) and foot-and-mouth disease to back up his claim that critical voices are marginalized in scientific debates. He considers that, in these areas, the British public has been "betrayed" by the scientific establishment. Few escape his reprobation: the UK government, industry, the universities, the Department for Environment, Food and Rural Affairs, the Food Standards Agency, the Biotechnology and Biological Sciences Research Council (Britain's main funding agency for research in non-medical life sciences) and the Royal Society all fare badly. *Nature* is also censured, for its "fudged" retraction of a publication on GM maize.

It is easy to agree with many of the general points that Rowell makes. Scientific advice to industry or government should reflect genuine scientific uncertainties. Absence of evidence is not evidence of absence; where more research is warranted into possible public health risks or the like, it should be carried out. Research results, properly arrived at, should not be suppressed, however inconvenient they may be. Scientific controversies should be resolved by open debate, free of intimidation and harassment. If, as Rowell believes, these self-evident rules are repeatedly being broken, then that would indeed be a cause for concern.

It is the specifics that let the book down. No one could dispute that there have been heated controversies over GM food, BSE and foot-and-mouth disease, but the accounts given here are so one-sided as to put off anyone other than the most hardened conspiracy theorist. Rowell, an investigative journalist, uses a wide variety of sources — ranging from *Nature* through reports of government inquiries to the satirical magazine *Private Eye*, supplemented by numerous interviews — but he uses them selectively, sometimes perpetuating misconceptions (for example, about how models of foot-and-mouth disease were developed) in making his case. There are significant omissions too. For example, Rowell develops at length the theme that there was a collective unwillingness to determine whether BSE posed a public-health risk, without mentioning that the CJD Surveillance Unit was set up in Edinburgh in 1990 in response to the Southwood Report for just that reason.

Rowell is also unwilling to consider that unexpected (and sometimes unwelcome) findings might be criticized for no more sinister reason than that the underlying methodology is flawed. The objective of peer

Exhibition

A hobbit-forming show

This cave-troll stars in an exhibition at the Science Museum in London to celebrate the technology used to make the hugely successful films based on J. R. R. Tolkien's novel *The Lord of the Rings*.

Some film-makers would have shot the epic trilogy entirely in the computer, but director Peter Jackson used techniques ranging from advanced mathematical modelling and virtual reality to Medieval methods of armour manufacture.

Some have commented that it is hardly the business of a science museum to give space to a show about a fantasy film. In response, the museum's exhibition manager, James Rudoni, says that the exhibition is "quite simply about the science and technology behind the most incredible movie project ever undertaken. The exhibition looks behind the innovation of the film-makers."

Some 18,000 visitors went to see the exhibition in its first week alone. It runs until



11 January 2004 before moving to Singapore, Boston and Sydney. **Henry Gee**
 ▶ http://www.sciencemuseum.org.uk/exhibitions/lordoftherings/default_flash.asp

review is not, as he seems to imply, to preserve the status quo for its own sake, but to filter out bad science. It is often true that controversial and high-profile results receive much closer scrutiny than routine results; that is hardly surprising. What matters is that such scrutiny takes place, is fair and works to generally accepted standards. In fact, much of the 'science' reported in this book appears not to have been subject to peer review at all.

Nevertheless, the book does raise the important question of how science should relate to industry and government while retaining its independence and working, as a publicly funded enterprise should, for the public good and with the public's trust. Rowell offers several suggestions in his final chapter, based on the three fine-sounding "principles" of humility, pluralism and diversity. Personally, I was too disenchanted by what had gone before to be overly impressed by these offerings; other readers may be more patient and charitable.

As this book illustrates, how science and scientists are perceived is changing in an important way. Nowadays, the pronouncements of the scientific establishment are not going to be accepted just because it is the scientific establishment. Alternative views will be sought and, if only because scientists are always ready (thankfully) to challenge main-

stream thinking, they will often be found. This is all to the good: debate is vital, and should be warmly welcomed. The point to emphasize is that it must be informed and responsible debate.

This is especially important when scientific disagreements have a direct effect on the public. For example, the recent controversy in Britain about an alleged association between the MMR vaccine (for mumps, measles and rubella) and autism is widely held to be responsible for a recent fall in vaccination coverage. This in turn has potentially serious public-health consequences of its own — a point that Rowell fails to make in a passing reference to this topic.

Ultimately, it is up to the scientists themselves to ensure that the debate is both informed and responsible. The artist James McNeill Whistler put it well in 1878: "I maintain that two and two would continue to make four, in spite of the whine of the amateur for three, or the cry of the critic for five." GM food, BSE and foot-and-mouth disease have all produced a great deal of crying and whining, but this must not goad scientists working on these subjects into making their two and two into anything other than four. ■

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