WHEN BIOTECHNOLOGY HITS THE HEADLINES

A challenge for scientists and the media

21

Surprising rejection of genetic modification

Journalists across the media – electronic and print – were somewhat taken by surprise when the European public rejected genetic modification (GM). The Calgene Flavr Savr tomato, followed by Zeneca's GM tomato paste, had been greeted by mild enthusiasm when they came on the market in the mid-1990s; they were certainly not seen as a threat. Indeed, with the help of obliging chefs making up a pasta sauce, journalists used the arrival of the tomato paste to fill space on a slow news day: a bit of fun. The advent of a new GM cheese using non-animal rennet and suitable for vegetarians also caused no special stir with the public or the media for several years.

In fact, GM technology at the time was far from being a problem for the public. On the contrary, people were aware of the huge medical benefits of advances such as GM insulin for treating diabetes. They were also becoming aware of the basics of the technology: that living entities could be changed or improved by rearranging their fundamental biological components.

The tone of the media's treatment of the new science continued to be quite light hearted. As advances in GM research emerged from specialist journals and conferences, they were reported in "gee-whizz" fashion. Could a jellyfish gene, for example, be inserted into a cereal and be programmed to switch on if the crop became stressed by sudden infestation, glowing in the dark to help farmers direct (and limit) their pesticide sprays? Could ultra-nutritious superfoods be devised? Or fruit carrying life-saving vaccines for the developing world? And so on.

Journalists' limited knowledge

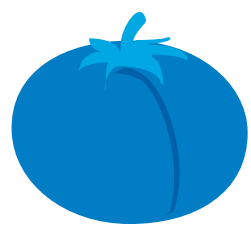
Alongside this slightly jokey approach to reporting GM, the media also encountered a comprehension problem. Many of even the most experienced and skillful writers and broadcasters had trouble understanding the language and concepts of the new technologies.

Journalists were also aware of the fact that the general public, too, would have difficulties with this new vocabulary. Every time they wrote or broadcast a story, the

KEY THEMES

- The nature of science in the media.
- Lessons from the past.
- Need for impartiality and scepticism.
- Value of being proactive with the media.

The Flavr Savr tomato was the first commercially grown genetically modified food to be granted a license for human consumption. Submitted to the US Food and Drug Administration in 1992, it went on sale just two years later.



media needed to give a simple explanation in the hope that this would provide adequate background.

One journalist, the distinguished science editor of the UK's *The Guardian* newspaper, Tim Radford, doubts whether the media had the ability to give sufficient background information, not because they explained badly or because readers failed to understand, rather because of the nature of the media and of the science itself: "People read newspapers very selectively and lose interest very quickly, especially if the stories they read contain almost meaningless acronyms and unfamiliar words such as 'mitochondrion', or 'genotype' ... molecular biology is quite difficult to understand even at the simplest level: most of us are not accustomed to thinking of ourselves as composites of 100 trillion cells of 200 to 300 distinct types, organised by 3.8 billion years of natural selection."

To make matters worse, the biological sciences were rapidly adding thousands of new words and meanings to its lexicon, placing an ever heavier burden on the journalist both to understand what scientists were actually saying and to report on it accurately.

Enter Dolly, the sheep

The cloning of Dolly, the sheep, in 1996 by Ian Wilmut and colleagues at the Roslin Institute in Scotland was a key episode in the public's perception of modern science. Dolly was the first mammal to be cloned from an adult body cell using the delicate process of nuclear transfer. Scientifically, it was a significant advance. Ethically, it rang alarm bells in the minds of the public.

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The cloned animal was regarded by many as science fiction come true, conjuring up visions of Mary Shelley's *Frankenstein* or HG Wells's *The Island of Dr Moreau* and evoking the stereotype of the mad scientist interfering with nature. Then, in the same year, came another reason to distrust agricultural science. The UK government announced that a human variant of the brain disease affecting cows – bovine spongiform encephalopathy (BSE) – might have been transmitted to an unknown number of people.

Scientists, however, had previously stated that this could not happen. More public unease ensued, planting seeds of disquiet for what was to follow later when Britain and other European countries started to reject the notion of GM food as well as research into GM crops.

A wonderful media opportunity

The alarm, outrage and protest over GM surprised not just scientists and journalists, but even the campaign groups that organised anti-GM events. Suddenly, prime-time television news bulletins were giving airtime to opponents of the new genetics, and newspaper editors were hunting for stories to feed the public's interest in biotechnology and its products.

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Dolly, the sheep, proved that a cell taken from a specific part of the body – in this case a mammary gland – could recreate a whole individual. Her eventual fate was taxidermy.

The media exploited this new opportunity in different ways. Some journalists tried to explain the science behind the technology in some detail; others played on public alarm with such headlines as "Scientists warn of GM crops link to meningitis". It was at this time that the UK's *Daily Mail* coined its resonant "Frankenfood" label.

The reaction of scientists also varied. Some vigorously defended the innovative technology, others remained silent. One could argue that the latter group missed an opportunity to put messages across to the public in easy-to-understand, plain language that would help correct any misconceptions.

Lessons from the past

What can journalists, or scientists who need to work with the media, learn from these episodes? Clearly, the GM debate as well as research into the molecular biology of plants are here to stay. So, too, are those who are hostile to the technology. Some see biotech advances as needless or valueless. Others find genetic manipulation inherently dangerous. Then there are those who regard science not as serving the needs of the hungry and deprived but the interests of multinational companies and global capitalism.

The duty of the journalist is to report all the science accurately and fairly. At the same time, the media in general has a duty to reflect the preoccupations and anxieties of society at large, listening to them and trying to make sense of how these worries arise.

And the media has another preoccupation. It has to sell newspapers and persuade people to watch TV or listen to the radio in a highly competitive industry that is also now trying to come to terms with the internet revolution. That is their job, and it is a different job from that of the scientist. In any future coverage of the GM issue, however, the media should bear in mind several questions about science reporting.

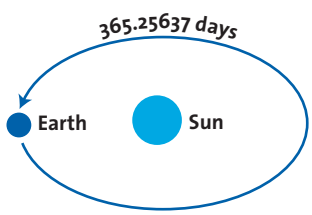
How much does the general public know about science? People are very good at assessing the immediate importance of scientific information when it is properly presented to them. But they cannot be expected to remember technical material from one day to the next: they have many other pressing interests and concerns.

Several decades ago a journalist could not use an acronym like "DNA" without explaining it in general terms. Today, DNA is part of most people's linguistic repertoire even if they cannot define it with any precision. Molecular science is moving quickly, but it takes time to use new terms comfortably, and public understanding struggles to keep up.

Is public suspicion about GM likely to endure? Not necessarily. Today, techniques such as organ transplants and *in vitro* fertilisation – test tube babies – are a familiar part of the medical landscape. But when they were first reported in the media they provoked anxieties, even outrage in some people. Their suspicions ebbed away as the new therapies began to deliver valued treatments.

What do people mean by "natural"? Natural is a tricky word. Modern staple crops – wheat, maize, rice and so on – are very different from their natural wild ancestors, which were first domesticated 10,000 years ago. The Green Revolution has seen dramatic changes brought about both by new crop strains and by improved management through the use of pesticides and fertilisers, irrigation control, careful planting schedules and so on. None of this is natural in the strict sense of being untouched by humankind. And nor are the engineered plants of today that draw on advances in molecular biology.

A survey carried out in the UK in 1989 discovered that one in three people did not know whether the Earth went round the Sun or *vice versa*, and two in three did not know how long it took.



Will GM crops really feed the world? The idea that GM crops provide the answer to the world's food supply problems needs to be looked at closely.

Only about 11 per cent of the planet's land surface is suitable for farming, with a significant fraction already degraded through overgrazing, mismanagement, erosion and excessive irrigation. What is more, projected increases in global population will cut even deeper into the total growing area, while the finite nature of oil supplies will drive more and more farmers to seek commercial gain through planting biofuel crops rather than food, although this is changing as biofuels are developed using crop wastes. When the effects of global warming – sea-level rise and changing rainfall and temperature patterns – are added to the mix, the capacity of the new genetics to come to the rescue, while significant, looks limited.

Certainly, GM crops could help alleviate conditions in some places. New strains are being developed that survive sustained drought and recover with the rains, or flourish in saline soil, or deliver higher levels of nutrition. But GM technology on its own cannot resolve all the difficulties ahead: it is no silver bullet. These problems demand political, social and economic willpower, and cooperation at an international level.

Only 11 per cent of the world's land area is cultivable. The rest is too shallow (22 per cent), too wet (10 per cent), too dry (28 per cent), has chemical limitations (23 per cent) or is permafrost (6 per cent).

Source: FAO

What do campaigners mean by the "hazards" of GM crops? Basically, they appear to mean that synthetically designed strains of crop – as opposed to those painstakingly produced over time by traditional breeding – could deliver unintended consequences. These could be of several kinds. There could be a hazard inherent in the very technique of splicing an alien gene into a food crop. Undesirable effects might result from introducing a trait that natural selection would have eliminated. GM traits could cross species barriers, entering the environment and putting local species at risk. An apparently benign alien gene might turn out to be a health hazard for consumers or other species. A malicious (or even simply unwitting) scientist could devise a dangerous organism. The list goes on.

The media needs to be aware of all these questions and try to see GM in its true perspective. Most modern cereal crops survive only because they are tended, fertilised, weeded, sprayed, harvested and then sown again in cultivated land: in the wild, they would not survive at all. And GM crops would perish just as swiftly as crops bred by traditional methods. In addition, GM crops are most likely to have been modified to reduce pesticide or fertiliser use, and therefore might even benefit their local ecosystem.

Genetically modified crops have been harvested for nearly two decades, during which there has been no demonstrable harm to a single human being eating them. Where then is the evidence that they are dangerous to human health?

The real hazard to biodiversity is not biotechnology, but population growth, intensive farming, climate change, pollution and the destruction of habitat. Compared with these, any additional consequences from GM are likely to be small.

Need for scepticism

The media must remain sceptical but impartial. We cannot know what the future will bring. Just as nuclear technology and medical science have the potential to be misused, so too might advances in GM. In fact, almost anything humans use can

be a force for good or ill: a hammer can both build things and kill. It is humans who choose how a technology is deployed.

The fact that acknowledged experts or confident politicians say that something is safe should not be enough to satisfy journalists or prevent them from asking awkward questions. That is their job: to challenge authority in the public interest.

Research on media coverage

A number of academic studies have investigated how the media has dealt with the GM debate. One important finding is that the topic very quickly ceased to be handled solely by science journalists because it had become a social, political and environmental issue, so was picked up by journalists working in these or broader fields. Had it remained with specialist reporters familiar with the language and concepts of biotechnology, it might not have become as contentious as it did for their colleagues with a less scientific background.

At the same time, it is perfectly proper for the media to ask penetrating questions about the purpose, direction, financing and business implications of GM. A science specialist is not always the best person to explore the industrial, economic and human welfare implications – positive and negative – of a technology.

A telling contrast in media know-how

There is no doubt that the public's response to GM was disastrous for the application of the new technology in Europe as compared with the rest of the world.

BOX 21.1 Science and people

Scientists need to come out of the laboratory and engage with the public.

- Everyone pays for science via taxes. So it rests on popular support.
- It follows that there is an obligation on scientists and it is in their interest to explain their science.
- Unfortunately there is no corresponding obligation upon anyone to listen, so scientists should regard themselves as obliged to make themselves heard and see this as an opportunity, not just a duty.
- If they are going to talk to people, they had better use the language of the people.
- This means using a language that is understood and gets attention.
- They must also listen to, understand and respond to people's concerns.

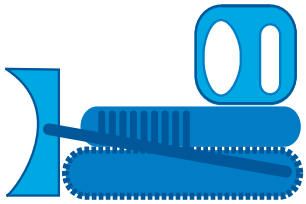
Would it have been better if its advocates had taken a different approach to the media? The introduction of embryonic stem-cell therapy as a possible treatment for serious diseases suggests that it certainly would. Scientists working in this potentially contentious field set about getting the public and the media on their side from the outset. They enlisted the help of charities and patient groups, provoked a national debate, confronted criticism from the world's religions and others worried about moral or ethical questions, and helped politicians to see the strength of their arguments and to make appropriate changes to legislation.

Most of all though, they had made sure – even before embarking on the research – that the public knew exactly what they were doing and why they were doing it, emphasising clear-cut medical benefits. They trusted the public's judgement.

These scientists were prepared to explain the complexities of their work and its ambitions in straightforward, vivid and easily understood language. The media, for its part, responded eagerly because here were genuinely good stories to tell a receptive public. Many journalists also felt that they were able to make a contribution to public acceptance of the new science.

Contrast this with the early days of GM technology, when scientists and industry seemed to feel that it was enough simply to have a good idea. It did not have to be sold to the public through clear and convincing explanations of benefits and the airing of possible hazards; they did not need to make any special efforts with the media to ensure that journalists sympathised with their efforts. Good science, they felt, was sufficient in itself.

In short, they did too little to persuade others, with the help of the media, that their ideas had genuine value. The ongoing debates and controversies show how misguided that attitude was. It was an experience that, later on, stem cell researchers learned from, as did those working in nanotechnology and other cutting-edge fields.



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