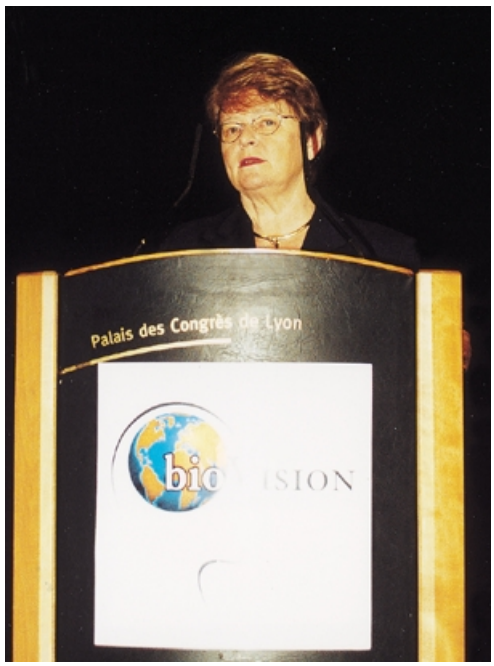
Can we afford to pay?

The bioVision 2001 summit in France examined the impact of biotechnology in the developed and the Third World, and the cost of inaction when addressing some of humankind's most pressing problems

If there could be such a thing as a G8 summit for the life sciences, this was it: bioVision 2001, the sequel to bioVision 1999, delved deep into the scientific, sociological and economic aspects of biotechnology and its uses. From 7–10 February, 2001, participants from across the globe congregated in Lyon, France, to learn of the latest developments in healthcare, agriculture, food and the role of industry in converting basic research into applications.

Much emphasis was placed on the consequences of life science research for society at large. The usual themes of technological advance, its implications for humankind, and public trust in such developments were addressed. 'The life sciences arouse deep reactions in the general public, and seem likely to overturn our cultural traditions,' noted François Gros of the Academie des Sciences de l'Institut de France in the opening plenary session. They are already overturning our complacent self-satisfied Western culture, and we are struggling to come to terms with it, but let us not neglect the Third World a second longer, for we will surely not have the luxury to philosophise about that. bioVision 2001 placed a strong emphasis on the need to bring developing countries into a shared 21st century. The message was unambiguous: if we did not listen and act now, we would not get a second chance.



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In the words of Gro Harlem Brundtland, Director General of the WHO, 'we have an unprecedented opportunity to make a difference; we must seize it. The price [of not doing so] is extraordinary—we cannot afford to pay it'. Yearly, tuberculosis alone costs the communities it affects US$12 billion according to Brundtland. Better health will result in major economic benefits in the developing world. Closing the gap between the First and Third Worlds relies on closing the knowledge gap caused by the concentration of research and development in the First World, but at present the priority is to provide cheap medicines to the Third World. To do this, partnerships between private, public and benevolent sectors are vital, as Robert Ridley, Chief Scientific Officer of the Medicines for Malaria Venture (MMV), noted. MMV relies on a public venture capital fund, and 'in kind' contributions from the pharmaceutical industry to develop affordable anti-malarials. The cost of producing one new drug every 5 years—a necessity in order to counter resistance—is US$30 million per year; the total cost per drug amounts to US$150 million. Though the aim is to involve more indigenous biotech firms in this initiative, the priority, as Ridley soberly conceded, is to develop the drug.

This did not satisfy Tikki Pang, Director of Research Policy and Cooperation at the WHO, who noted in his presentation that only 3% of world resources were devoted to diseases that affect 90% of the world's population. Meanwhile, the pharmaceutical industry invests the bulk of its R&D budgets in treatments for 'lifestyle diseases'—diabetes, atherosclerosis and obesity—that affect only the affluent consumers in the First World. What, after all, do computational prognostics and molecular profiling offer to the Third World? Homegrown industries that cater to the demands of developing countries need to be established, but they will, inevitably, have to feed off the results of research done in industrialized countries. To allow such access, means revising the patent and intellectual property laws. Francis Collins, Director of the National Human Genome Research Institute at the NIH, stressed that the subjects of intellectual property rights and patents need revisiting urgently lest they hamper, rather than help research. As he noted, 'If you want the road from basic research to application to be well maintained, regulated etc, then it's reasonable to expect that there should be a tollbooth on that road. But we mustn't move that tollbooth too close to the start of the road'.

While the Third World urgently needs help and technology transfer from industrialized nations to tackle infectious diseases, starvation and malnutrition, the developed world faces challenges of its own: the threat of misuse of genetic information that accompanies our growing knowledge of the human genome. Of genetic discrimination Collins noted 'this ought to be off the table in employment and health insurance'. Clearly, we need new legislation that effectively allows the public access to their genetic information

Collins: Genetic determinism gone wrong. 'Those well-heeled couples who decide they want a virtuoso musician may be disappointed to discover that their son turns into a sullen adolescent who smokes marijuana and doesn't speak to them.'

while preventing discrimination by private companies or governments. An unfettered belief in genetic determinism may have some bizarre and undesirable consequences for consumers too, since genes, as biologists well know, are not everything. 'Those well-heeled couples who decide they want a virtuoso musician may be disappointed to discover that their son turns into a sullen adolescent who smokes marijuana and doesn't speak to them,' joked Collins. But the message was serious. Might we come to think of ourselves as genetically programmed machines to be improved or altered at will? 'I find this chilling,' said Collins 'because we assume that we know what an improvement is.' History shows us that we do not.

Nevertheless, improvement is the most important message that biotechnology is sending to the world. And while the public now widely accepts that molecular biology and its commercial exploitation have contributed to better health care, the picture is radically different when it comes to biotechnology in agriculture. The potential benefits of genetically engineered crops have been eclipsed by the public's resistance to them. Their perceived risk to human health and the environment have vastly outweighed their perceived benefits. The public perception of risk is obviously not something to which one can pay lip service, as the audience learned in the plenary report on the parallel session, Food Safety and Public Acceptance. Quietly seething throughout the report given by Thomas Hoban, Professor of North Carolina State Universtiy, was Donald Bruce from the Church of Scotland, and Director of the Society of Religion and Technology in the UK. 'If you presented this [report] to the average NGO it would be rubbished,' Bruce asserted, adding that it was 'such an industry view' and that it had 'missed the point'. The point is, of course, that NGOs are fed up with hearing of potential benefits when they come at the expense of a consideration of the risks and alternatives. But the irony, as Hoban pointed out, is that consumers never represent themselves in the public debate, so no one really knows what they want. Instead, NGOs have made themselves the consumers' representatives, and that makes communication between the scientists and the real consumers more difficult. Indeed, Hoban pointed out that it was not consumers that had forced retailers to remove GM products from their shelves, but NGOs.

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Donald Bruce chairs a UK initiative that brings experts from a variety of backgrounds to discuss head to head how to reconcile society and technology. In the session on Agriculture & Environment he explained that food is a very sensitive topic to many people. This is because it is of such cultural, traditional and personal importance. Choice is everything. 'You have to separate and label, otherwise there will be no GMOs at all, and that is what has happened,' Bruce said. But it obviously depends on the country in

Francis Collin's predictions for the next 30 years

2010
- Genetic basis of most diseases known
- Predictive genetic tests available for a dozen conditions
- Interventions available to reduce the risk of contraction for a few conditions
- Many primary health care providers begin to practise personalized medicine
- Pre-implantation diagnosis available
- Reasonably effective anti-discrimination legislation in place

2020
- Gene based designer drugs available to treat diabetes and hypertension
- Cancer therapy is precisely chosen according to molecular fingerprint of the tumour
- Patient specific pharmacogenomic approach is standard practice for many drugs
- Mental illness diagnosis transformed, new therapies under study, societal views shifting from old prejudices
- Homologous recombination technology suggests that germ line gene therapy could be safe

2030
- Comprehensive genomics-based healthcare
- Full computer model of human cell replaces many lab experiments
- Average life span reaches 90 years, putting pressure on prior socio-economic norms
- Major anti-technology movements active worldwide
- Serious debate underway about humans possibly taking charge of their own evolution

Bruce: Choice is everything. 'You have to separate and label, otherwise there will be no GMOs at all, and that is what has happened.'

which you live. Julie Hill, from Green Alliance, a UK organization whose mission is to 'promote sustainable development by ensuring that the environment is at the heart of decision-making' informed the audience accordingly. In the report from the Agriculture & Environment parallel session she noted that the Chinese embrace GM technology, and believe in its safety on the basis of 5 years of field trials and the consumption of GM rice by more than 300 million. Hill conceded that conventional agriculture had changed the environment, and that the introduction of non-native species to fields was not new.

If Bruce and Hill represent the constructive face of public concern, other NGOs still concentrate their efforts on stirring public concern rather than presenting and discussing its merits. During the after-dinner debate at the end of the first day, it became clear that all the efforts of the agro-industry and Greenpeace to find a compromise had come to nothing. Arthur Einsele, Head of public affairs at Syngenta, Mark Sears from the University of Guelph and Benedikt Haerlin from Greenpeace demonstrated admirably how little can be achieved if one side is essentially unwilling. Einsele's account of Syngenta's efforts to determine whether Bt corn pollen was toxic to monarch butterfly larvae—they found no toxicity at any dose tested—left Haerlin cold; he could not be satisfied by that, especially since the research had been done by industry, nor by anything short of a promise not to release GMOs into the environment. This raised the ire of John Purvis, Member of the European Parliament. His fury and frustration were palpable as he took the microphone to have the last word of the evening. The efforts made by the European Parliament and European agro-industry to find a middle ground with Greenpeace had been a 'waste of time', Purivs said, since Greenpeace insisted on returning to its truculent uncompromising stance. 'We don't want you to release GMOs into the wild, that is all' restated Haerlin. It was left to Sears to save the day with the platitude that all was not lost, and that it was a long road that Greenpeace and the agro-industry were going to travel together. But in fairness, what more could he say?

> Might we come to think of ourselves as genetically programmed machines to be improved or altered at will?

Fortunately this was not the note on which the conference ended. In general, NGOs accept that biotechnology may benefit humankind, but that we need to revisit, revise and develop more conventional approaches as well. As Julie Hill pointed out, 'This technology has huge potential for good, but that depends on how we use it. At the same time, we must accept that there are certain aspects of the technology that the public really doesn't want.'

> There are risks with everything new, but as the Nobel laureate Jean Marie Lehn remarked 'with risks come opportunities; a zero-risk world is a dead world.'

Many generalizations can be drawn from the conference, among the most important are those referring to developing countries and the consumer confidence in science. Industry cannot, and must not, be relied upon to help the Third World. This can only be done by public/private partnerships. Research can no longer be done without an ethical consideration of its consequences. Furthermore, it is now widely accepted that simply providing the public with information is not enough. Dialogue with the public enables the discussion of alternatives, and throughout the conference the NGOs' plea was that biotechnology be thought of not as *the* solution to the world's problems, but as one of many alternative approaches to solving them. There are risks with everything new, but as the Nobel laureate Jean Marie Lehn remarked 'with risks come opportunities; a zero-risk world is a dead world.' Wise words indeed, but how much better they sounded coming from him than from industry…

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