POLICY FORUM: BIOTECHNOLOGY

The Swiss Vote on Gene Technology

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Swiss biologists are still stunned by the hurricane that recently hit them. The "Genschutzinitiative" (Gene Protection Initiative) marked the success of a 6-year effort by activists to use one of the most powerful tools of Swiss democracy: the initiative. Any Swiss collecting 100,000 signatures within 18 months supporting an issue can force a national vote on that issue. The issue this time was to stop the "excesses" of recombinant DNA technology. The Gene Protection Initiative demanded that the government outlaw (i) the generation, purchase, or distribution of transgenic animals; (ii) the release of genetically altered organisms into the environment; and (iii) the patenting of transgenic animals and plants, of their components, and of the relevant processes.

Ominously, the initiative also demanded that experiments with all genetically modified organisms require proof of benefit and safety, proof of the lack of alternatives, and a statement of ethical responsibility. The term "animals" was meant to include worms, flies, fish, and mammals. Acceptance of the initiative would have ended Switzerland's preeminent role in biomedical research and prompted many biologists to leave the country.

Roots of the Initiative

The explosiveness of this initiative becomes apparent if one recalls where this happened. Switzerland is a world leader in biomedical research (*1*), and the heart of the biomedical research community is Basel. Basel contains about 300,000 inhabitants, yet boasts the Basel Institute of Immunology, the Friedrich-Miescher Institute, the Biozentrum of the University of Basel, and the research laboratories of pharmaceutical giants such as Novartis (the former Ciba-Geigy and Sandoz) and Hoffmann–La Roche. As much as one-third of Basel's population derives its support, directly or indirectly, from biomedical research, and 40 to 50% of all animals used in Swiss biomedical research are used in Basel. Yet this city was one of the epicenters of the initiative—many of the key activists and a disproportionate number of supporting signatures came from the Basel area. This assault on modern biology did not come from outside; it was a palace revolution.

Key activists were Florianne Koechlin, a chemist; Ruth Gonseth, a dermatologist and parliamentary representative of the Green Party; Simonetta Sommaruga, executive officer of the Foundation for Consumer Protection; and Margrith von Felten, a lawyer and parliamentary representative of the Socialist Party (see the figure).

Key fighters for and against the Gene Protection Initiative (from left to right). Upper row: Florianne Koechlin, Ruth Gonseth, and Simonetta Sommeruga. Lower row: Rolf Zinkernagel, Peter Mani, and Adriano Aguzzi.

In October 1994, a Swiss Working Group on Gene Technology constituted itself and collected 111,063 valid signatures within 17 months. It was supported by about 70 other organizations, which included Physicians Against Animal Experimentation, several organizations for natural healing, several animal rights organizations, Greenpeace Switzerland, World Wildlife Fund Switzerland, Swiss Organic Farmers, the Swiss Lutheran Women's League, and the Swiss Catholic Women's League.

Many of the initiative's most vocal and determined activists were educated women. Their most visible individual male backers included physicians disenchanted with animal experimentation and research scientists formerly associated with pharmaceutical companies. Quiet but firm support also came from small farmers and many Swiss artists. Artists see things that are hidden from others. What did they see that we scientists missed?

The Campaign

The vote was set for the weekend of 6 to 7 June 1998. On 26 April 1996, the 10th anniversary of the Chernobyl disaster, full-page newspaper ads appeared that equated the dangers of nuclear technology with those of genetic engineering, proclaimed the uselessness of all animal experimentation, and castigated biological research for its failure to cure human diseases. And then came discussions on television and before public interest groups. At first, scientists often left a poor image because they participated without sufficient preparation. But Interpharma, the public relations arm of the pharmaceutical companies, had set up GenSuisse, a professional, well-funded public opinion group that also included representatives from universities and other public organizations. GenSuisse caught the public's attention mainly through effective posters that depicted sick children or prominent Swiss biologists working on well-known diseases. Unfortunately, government organizations such as the Swiss National Science Foundation had to remain silent, because Swiss political tradition forbids government organizations from influencing a public vote.

Last year several Swiss academics finally assumed effective leadership in the fight. Three of the most visible ones were immunologist and Nobel laureate Rolf Zinkernagel, virologist Peter Mani, and neurobiologist Adriano Aguzzi (all from the University of Zürich) (see the figure). Zinkernagel and Aguzzi excelled in debates on television and with the press; Zinkernagel also started a regular science column in *Blick*, a widely read Swiss tabloid. Mani organized an effective e-mail network that informed Swiss biologists of the latest debates, effective and ineffective arguments, and the tactics of the initiative's proponents. Some representatives from the pharmaceutical companies, including Interpharma's Thomas Cueni and Novartis' chief executive officer Alex Krauer, were also excellent debaters, but their affiliations made it more

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difficult for them to capture the hearts of their audience.

Yet it was the hearts that mattered. In several public debates, scientists argued succinctly and quietly yet lost to the emotional charm of Ruth Gonseth. Unemotional reasoning was a blunt weapon in fighting this emotional issue. Scientists are trained to hone the logic of their brain, but not that of their heart.

The public media had no difficulty with that logic. Whereas the Basel newspapers stood firmly behind science, other large-circulation Swiss newspapers and even Swiss television pandered openly to public fears, sometimes stooping to grotesque distortions.

In January 1996, a poll showed that 62% of the voters rejected gene technology, 25% supported it, and 13% were undecided. Two years later, the percentages were 47, 26, and 27 (*2*). Alarmed by these numbers, almost 5000 Swiss scientists and physicians demonstrated on 28 April 1998 in the streets of Zürich, Geneva, and Lugano for the freedom of scientific research (*3*). In spite of a few dozen Greenpeace hecklers, the demonstrations were peaceful and alerted many voters to the grave threat to Switzerland's biomedical research.

One month before the vote, the fight became especially bitter and rife with hyperbole. Fundamentalists from both sides had their heyday. Visions of a hapless populace poisoned by "gene food" were countered by claims that acceptance of the initiative would stop biological research altogether. The fight sent a rift even through the academic community, pitting the humanities against the natural sciences. But as voting day approached, the public suddenly tilted against the initiative. When ballots were counted in the evening of 7 June 1998, 67% of the voters had rejected the initiative. It failed to carry even a single one of the 26 cantons, but it did bare the manifold souls of Switzerland. Whereas in some French-speaking cantons more than 80% of the voters rejected the initiative, rejection by the conservative cantons of Bern and Graubünden was below 60%. Overall, 74% of the men but only 63% of the women rejected the initiative. The gender bias had been more than twice as high earlier in the campaign. As expected, rejection correlated with educational level, but the correlation was weaker than expected (*4*).

Analysis of the Vote

We scientists could congratulate ourselves that science won and that we can now get back to work. Such an attitude would be foolish and dangerous, for we had massive and skillful help from pharmaceutical companies, and almost a third of the Swiss still oppose gene technology. It would be equally shortsighted to rejoice in our new contacts with the press and our experience in arguing with the public. We may have become battle-wise, but we have not yet confronted the roots of the conflict.

What are these roots? Are they the public's scientific illiteracy, its unwillingness to accept natural science as "culture," its unrealistic insistence on "zero-risk" innovation, or its romantic view of life as a perfect, fragile deity succumbing to the slightest human-made imbalance? Are such conflicts inevitable if pluralistic societies sponsor subgroups whose work they do not understand? Or did the initiative teach us once again that direct democracy is dangerous if it decides complex scientific and technical issues?

All of these points are valid and have been made before, but none of them can explain what happened. If the initiative sprang from scientific illiteracy, why were so many of its key activists scientists or physicians? If it aimed at zero-risk food, why did it ignore the infinitely greater menaces of cigarettes, alcohol, and junk food? And how can we reconcile the initiative's emotional juggernaut with a 1997 poll (*5*) in which 1015 Swiss voters ranked gene technology as a minor problem (8%), far behind unemployment (82%), health (51%), and social security (39%)?

I suggest that this confrontation sprang from deeper roots. One of them showed in the debates, in which the public branded transgenic plants as obscene and dangerous follies foisted on consumers by profit-hungry corporations. The initiative was launched at a time when companies around the world expanded globally, merged into corporate behemoths, and fired long-time employees. Many Swiss had begun to view multinational companies as heartless giants and chose the high-tech products of those giants as targets of their frustration. Switzerland, one of the world's oldest democracies, began to doubt that her elected representatives could still rein in international conglomerates, and the public began to fear that democratically elected representatives no longer decided Switzerland's fate.

An even deeper root is revealed by the observation that the initiative pitted a male-dominated scientific establishment against a coalition that was led by educated, successful women and supported by many of Switzerland's artists. It would be foolish and offensive to posit that women do science differently than men, but it would be equally foolish to deny that they often see life's problems from a slightly different perspective. Only the combined stereoscopic view of both genders reveals life's many dimensions. Multidimensional sensitivity also defines an artist. The two best vantage points from which to reflect on human issues may well be artistic individuality and an interactive society with its natural balance of sex chromosomes. Because we selected against both when grooming our scientific leadership, it has a distorted emotional perception and fails to understand that human beings reason with their heart as well as their brain. I suggest that the artists felt this emotional distortion and turned against us (*6*). A male-dominated science establishment is not only unjust and wasteful of a nation's talent, but also socially unstable. Its lack of empathy, its aloofness, and its unnatural maleness will always render it vulnerable to attack.

What can we do? I mention two points that have not received the attention they deserve.

1) Increasing female leadership in science is essential to ensure acceptance of science by the public. Doing away with male dominance is not a magnanimous gesture but an act of self-interest.

2) We must restore our bonds with the artists. Artists used to be our natural allies, but we lost them over the course of this century. To prevent our scientific meetings from becoming trade shows, we could routinely open or close them with an art exhibit, a concert, or a poetry reading. We should convince our funding agencies that sponsoring public debates between scientists and artists or commissioning works of art on modern biology is a legitimate and effective way to promote public acceptance of science.

The vote on this initiative is being intensively analyzed and may well become the most researched vote in Swiss political history. Scientists should pay attention to this analysis and heed all serious critics but should refuse to be deafened by the triple forte of fundamentalists, fanatics, and fools. What counts are the quiet chords of the unanswered question "What could scientists do better?"

References and Notes

1. R. M. May, *Science* **275**, 793 (1997).
2. *Report on "Genschutz" Initiative* [Gesellschaft für Sozialforschung (GfS) Research Institute, Berne, Switzerland, May 1998].
3. P. Laymann, *Chem. Eng. News* (13 July 1998), pp. 33–34.
4. C. Longchamp, *VOX-Analysis of 7 June 1998* (GfS Research Institute, Berne, Switzerland, 1998).
5. C. Longchamp and P. Huth, *Barometer of Concerns* (GfS Research Institute, Berne, Switzerland, 1997). Respondents were asked to pick from a list the five problems they considered most important.
6. Artists are not considered to be significant economic opinion factors and are ignored in most polls. However, their hostile view of gene technology is generally acknowledged by Swiss public opinion researchers (C. Longchamp, personal communication; T. Cueni, personal communication) as well as by the many artists I talked to.