# Discussion

**Ismail Serageldin:** Klaus Leisinger said some very important things that I hope we will focus on. One was that if we are concerned about the inadequacy of public resources, one of the ways to tackle that is to increase public investment in research that the private sector is not going to do. There is a balance between the two: there are some things that the public sector will do, and there are some things that the private sector needs to do.

Miguel Altieri highlighted the set of what he referred to as the kinds of biotechnology that should be done, and he was happy that the Novartis Foundation is funding some of that, working in the Sahel. But we cannot expect that the Novartis, which is a profit-making institution, would necessarily invest its money in doing that kind of research, except through the removal from commercial considerations.

The second point of concern is that we need to try to resolve the degrees of risks that really are associated with that question. Over the next two days some very distinguished people will be addressing that. Professor Werner Arber, the president of the International Council of Scientific Unions and a Nobel Prize winner for research in enzymes, will be our opening speaker tomorrow, and Henry Kendall, of the Union of Concerned Scientists, and a Nobel Laureate in physics, also will be speaking. The questions of just how much risk there is, and how we can guard against it—that is a separate set of issues which we can also address. But it will take time, and we have two whole days for that, tomorrow and the day after.

**Audience comment:** I was very interested in the comment on how Ciba-Geigy is handling this issue of licensing, allowing the Consultative Group on International Agricultural Research access to licenses. I have experience with a somewhat different system, which we have practiced within the Biofocus Foundation. Many private companies with which we have been in touch have accepted it without hesitation. We favor patenting, but we also say that the license fee should be tied to the GNP per capita in the country where the intellectual property right is practiced. That may be a variety of the same approach that you take.

**Pat Mishey:** I am taken by the question that you raised of the biotechnology being driven by market forces, rather than concern for the common good of poverty and hunger alleviation. I would like that addressed. And the question of who is responsible and accountable when things go wrong? And what about the precautionary principle, to prevent harm? How can we hold companies accountable for the prevention of harm? Is the burden on the people to deal with a disaster after it happens, or is the burden on the companies to show, in advance of applying the technology, that it will do no harm?

**Audience comment:** It is not the companies that are responsible for the mess that we are in, or the multinationals, but rather our whole economic system, which is incompatible with ecological well-being.

**Gabby Balsheart:** I have two questions. First, do consumers want genetically manipulated organisms in their food? Second, do small farmers in developing countries want the seeds that they cannot use any way they want to?

**Klaus Leisinger:** On the last questions first I am very much in favor of open labeling, because then consumers have the choice. If they want to buy a tomato, they should be able to see whether it is a "normal" one or a flavor-saver, and then they can make the choice.

Do the farmers in the developing countries want genetically engineered varieties? They want varieties that bring them an economic benefit. If a farmer with one or two hectares can feed his or her family with one variety and cannot feed his family with the other variety, his choice will be obvious, and he will not care about whether that variety was modified by traditional methods or by genetic engineering.

Miguel Altieri, I can give you, for free, the results of our 12 years' research on striga. If you intercrop with cowpeas, the striga goes down by 85 percent without any chemicals being used. The choice is not between the most modern biotechnology and traditional technologies. There must be technological pluralism. The right mix very much depends on the circumstances. It depends on the time. Ten years from now more than 50 percent of the people in developing countries will be urban people who cannot produce food for themselves. Then we might have to look at a dual agriculture, where part of the food is mass produced, and we have to do anything that is possible to help the marginal farmer to survive. And to bring up this Manichean picture—it is either bad or good—this is simply not my perception of the world. Do farmers buy things they do not benefit from? Is the propaganda of the multinationals so powerful that they can overcome the economic judgment of farmers? If so, they must be very different from the farmers we have in Switzerland or Germany.

Last but not least, and I do not want to be unfriendly or politically incorrect, but I have heard a lot of this diffused uneasiness about our economic system not being fit for the survival of humanity. Well, about eight years ago we had another system collapse. So there are not too many alternatives. The political task is to make the market economy socially compatible and ecologically sustainable. There are no instant solutions. For many countries this will be a matter of trial and error, which is going to be developed over many years. One element that was mentioned by Ismail in the morning session will produce a lot of progress—let us try anything to make prices tell the ecological truth. Once it is no longer possible to externalize ecological costs, then all of a sudden it will be the consumers'choice.

Last, if we put the burden of proof about risks on those who innovate, we will not have any more innovation. Because we can never guarantee that we have not missed a risk during the research stage. We have to use the best available knowledge to minimize the probability that severe risks may emerge. That is the precautionary principle today. Most companies cease producing products that show ecological incompatibility in the early stages.

**Lori Thrupp:** I found it very interesting that both Dr. Serageldin and Dr. Leisinger pointed to the fact very lucidly that, to use your exact words, "there are no technological solutions to social and political problems." And that was preceded by a very strong point which many of us have acknowledged for many years, that the root of food insecurity is largely related to social and political factors. Food production, therefore, is not sufficient. We acknowledge that.

Yet, it seems ironic that we come back repeatedly to funding, to investing tremendous amounts of funds from the private sector and the public sector in purely technological solutions. If we are looking at issues that are largely related to distributional questions, to ensuring sustainability over the long term, which require a change in paradigm of production related to the sort of model of science and of society that Miguel alluded to, then why do we come back repeatedly to look for technological solutions? I am not deny-

ing that there is a food insecurity issue, or that we do not need more production. But I think that we are looking for the wrong solution by investing huge sums of money into largely technological solutions. I wonder if some of you might want to address that?

**Ismail Serageldin:** This discussion is focusing on biotechnology because that is the issue before this panel. The issue of biotechnology as a technology raises many issues of a visceral nature, of an ethical nature. This is not to say that other issues are not important: the bulk of the World Bank's investments in agriculture, which are running at US$3.5 billion a year, in support of maybe a total of US$7 billion of spending by the developing countries, is largely not in technology. Out of that there may be a couple of hundred million that are going to technological improvements. The bulk of it is going to issues from land reform to rural roads to agricultural credit to access—a whole range of issues, changing the prices that you were talking about.

Second, and I tried to emphasize this point, the fact that we recognize that the distributional issues are absolutely essential does not remove the fact that the production side is extremely important. Everybody agrees on the demand side—that we will need roughly twice as much production of food on this planet within a generation and a half, partly due to population growth, partly due to income growth. Before we worry about the distributional aspects, if we do not have the overall balances, we know who is going to be squeezed out. It will not be the rich who will go hungry, it will be the poor. That was Amartya Sen's major observation: that people who focus only on the production side and who say that if the balances are in place then everything takes care of itself are not correct, a point that Norman Myers reminded us of.

This conversation is not a total picture, but it is focusing on one subset of it. In that light we are not denying the importance of all these other aspects.