

BIOTECHNOLOGY AND THE ENVIRONMENT

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I would like to start my short introduction with a remark: Today more than half of the global population depend on fuelwood and biomass produced with conventional means in order to cover their energy needs.

"Biotechnology", defined as the use or development of techniques using organisms or parts of them to provide or improve goods and services (e.g. by improving animals and plants or by developing micro-organisms for specific uses), is a new term that represents a rapidly expanding technology which has centuries-old foundations: people have deliberately selected species for agricultural purposes and have adopted practices for management of livestock and food-making since the beginning of civilisation.

More recently a better understanding of genetics led to the development of antibiotics and chemical production whereas in our days molecular and cellular biology has led to genetic manipulation and a real revolution in entirely new technologies.

Recombination of DNA, creation of hybridoma, creation patenting and marketing of micro-organisms, monoclonal antibody diagnostic kits, automated gene synthesisers, r-DNA animal vaccine, pharmaceutical products are some of the recent developments, for which billions of dollars or ECU's have been invested.

Biotechnology will undoubtedly play a crucial role in the years to come. A role which can be useful for better management of natural resources and identification, or improvement of processes for food energy and pharmaceutical production or purification. These processes could be more friendly to the environment but could also include risks. As it was stated in the Bogeve Declaration "Towards a people-oriented Biotechnology" (March 1987). As a global issue, it cannot be assigned such attributes as positive, negative or neutral. Like any other technology, it is inextricably linked to the society in which it is created and used, and will be as socially just or unjust as its milieu. Therefore, in today's world this most powerful new technology is more likely to serve the interests of the rich and powerful than the needs of the poor and powerless.

The potential of biotechnology to improve the quality of life of humanity is fully recognised. But it is important to emphasise the risks and hazards associated with biotechnology, including serious and possibly irreversible health, safety and environmental and socio-economic consequences, as well as the use of such technology in biological warfare.

In agriculture, for instance, while biotechnology promises to increase production and reduce costs, it should be avoided to accentuate inequalities in the farm population, or aggravate the problem of genetic erosion and uniformity, undermine life-support systems, or increase the vulnerability and dependence of farmers from transnational agribusiness. The initial concerns about the way experiments are carried out and accidental escape from scientific laboratories of organisms which might cause diseases seem relatively adequately addressed by involved scientists. However there are still questions about the environmental and health implications of large-scale industrial production involving risks from accidental release of living organisms and also from the use of novel organisms in agriculture and for environmental purposes. It is well documented that exotic organisms introduced in any ecological system might sometimes play a negative role to the extent that populations of natural species are severely disturbed or even expelled.

On the other hand it is also documented that very high mortality followed the introduction of micro-organisms into regions where people had not been previously exposed to the specific harmful agent.

Agricultural crops have also been devastated following the introduction of a new disease agent produced by micro-organisms genetically similar to species that previously had little or no effect at all on the crop. In general, any novel product of rapid development in research, which relatively easily and in most cases very quickly, is used or marketed in large scale exercises, includes high risks to public health, ecology and the economy.

Being a researcher myself (in the field of the environment, not in the field of biotechnology) I am well aware that every kind of research includes a certain extent of risk, and what I have just said should not be understood as a fear which raises unnecessary obstacle to development. On the contrary, the result of awareness about the complexity and importance of the issue at national, European and global level and the belief that "prevention is always better than cure" is used by everybody but is very rarely followed, particularly by politicians and policy makers. Their usual complaint when confronting a new problem, is that they do not have enough information to make decisions and, more often than not, they are correct.

Biotechnology is one of these cases, particularly because a large part of recent research has been carried out in secrecy due to: (a) the particular relation between research institutes, universities etc. and industry in this very field and, (b) until recently very few countries have addressed the matter of environmental implications of biotechnology in a comprehensive way.

To the best of my knowledge, apart from some US guidelines applied on a voluntary basis by universities and certain industries and a draft EEC recommendation on the r-DNA research, there are no specific regulations applying to biotechnology processes although many of the existing EEC directives cover, at least partly biotechnology products or wastes. It is clear that in order to properly face the problem several new directives and regulations should be prepared, more harmonisation and legislation should be introduced and adequate infrastructure should be developed. Better information and assessment on the nature, extent and possible consequences of biotechnology on the environment are still lacking. Moreover the meaning of data and assessment that are available are often either too vague or too technical to be understood by policy-makers or the public. The public is very poorly informed about the issue and in most cases doesn't even understand the terminology. Public participation and involvement are crucial when you address a new problem, so ultimately there is a willing attitude in the business sector that recognises its self interest in sound examination, from the environmental point of view, of any negative implications of biotechnology. After all, even if other important factors are disregarded, mistakes and/or bad policies in terms of sustainable development can send billions of ECU's into counterproductive programmes.

With the growing importance of and pressure on the biotechnology issue, both international organisations and governments might come soon with proposals for common international actions and agreements. Environmental NGO's, the EEB and its member organisations in particular should try to positively contribute to the formulation of any European or international policy. Therefore high quality information and reliable data on biotechnology and its environmental implications should be obtained and diffused to all interested organisations. Furthermore the issue will be closely followed by a competent EEB Working Party and an ad hoc joint committee of representatives of the European Parliament, the CEC and the EEB.

* EEB: The European Environmental Bureau is the Brussels-based coalition of the approximately 100 most important Environmental Non-Governmental Organisations of the 12 member states of the EEC. Its individual membership is over 17 million Europeans. It has consultative status with all European Community's bodies and also with the Council of Europe and has several hundred conferences and publications.

Professor **Michael J. Scoullios** obtained an M.Sc. and D.Sc. from the University of Athens and later received a Ph.D. in Oceanography from the University of Liverpool, and a Professorship of Environmental and Marine Chemistry from the University of Athens. He is President of the Greek National Committee of the University of Athens and the Greek National Committee of the European Environment Bureau, and the E.E.B., and a member of the Mediterranean Scientific Association for Environmental Protection, the European Association for Marine Sciences and Technology, the Greek National Commission for UNESCO, and the Environment Group of the Society of Chemical Industry in the United Kingdom.