

Editorial: The Social Space and Conceptual Frameworks in which Biotechnology Operates

For over two decades the scientific and public debate on biotechnology has been characterized by an intensive pro-anti confrontation in which advocates have emphasized the advantages and opponents the risks of the developments in biotechnology. Both groups, however, have applied the same scientific assumption that biotechnology may be considered as an artifact, separated, that is, from society, with good or bad social consequences, a fate we have to choose or reject. Neither of the two groups have focused on whether and how biotechnology, as an ensemble of social and technical dimensions, is open to change. The articles in the second volume of *Tailoring Biotechnologies* emphasize the social space and conceptual framework within which biotechnology is developed, allowing concepts of change and (re)design.

In a thought-provoking article, **Marcello Buiatti** argues that the foundations of contemporary biotechnology rest on an extreme abstraction, one based on the assumption that life is mechanical and can be altered and manipulated independently of its context (a theme also addressed in an article written by Steve Hughes in the previous issue of this journal). In the 1980's, this idea gave birth to a generation of genetic engineers who thought that life is a mechanical interplay of single genes and that they could, accordingly, fashion optimal life forms by adding, subtracting or replacing genes responsible for particular characteristics or functions. Although knowledge of genome functions and dynamics changed, showing that genes express themselves in networks (and that therefore their functioning cannot be understood in isolation) and are rather ambiguous, the old myth of genetic engineering (and the project of homogenization) still captures the imagination. Buiatti concludes his article with several considerations and recommendations for change.

In a Foucauldian analysis of biotechnology and genomics, **Hub Zwart** analyzes the biotechnology that emerged in the 1970's as one that was basically directed to control life by means of genetic modification, and argues that it could be seen as a new chapter in the history of bio-power, the concept used

by Foucault to describe how, in the 18th century, life itself became the immediate object of control and modification. Like Buiatti, Zwart argues that life scientists considered themselves to be engineers, perceiving life as a raw material that could be adapted to particular interests by means of genetic intervention based on single genes. Zwart contrasts the monogenetic biotechnology with the concepts of genomics, which, he argues, have nothing as such to do with engineering life, other than contributing to an appreciation of its complexity and diversity. He argues that whereas genetic engineering is associated with this issue of bio-power and control over subjects, genomics is associated with the issue of how people can constitute themselves as subjects.

Just as genes cannot be considered in isolation but are parts of networks, so biotechnology too has to be considered in its wider context. It is revealing that, although biotechnology is promoted in international forums as a tool for fighting hunger, the economic policies imposed by these same forums produce hunger on a global scale. **Lou Keune** argues here that even development policies promote hunger. Keune's contribution, in the field of development economics, is mainly concerned with the neo-liberal paradigm. The article shows how the terms of trade deteriorated since the 1980s, with small producers and low-income groups having few opportunities to attain bottom-up development, including that of the most adequate technologies. The constitution of 'development' within this paradigm has far reaching consequences. Not only does it result in phenomena like poverty, inequality and deterioration of the environment, but has also ended in practices in which human and natural resources have been withdrawn on a large scale from the means of existence for people in developing countries. Lou Keune concludes that the pressure on developing countries and their residents to completely open up their economies to international trade and investment must stop. Their right to their own development must be acknowledged, including the right to use and re-design technologies adequate for the specific situations people are in.

In his contribution to this issue, **Ezio Manzini** describes five different sub-systems in which food production and innovation takes place: the traditional system, the classic, experiential and advanced agro-business systems, and social experimentation. Manzini's article highlights the need for a design culture capable of raising more profound questions about the sensory nature of food and food production. The author introduces the concept of 'creative communities' and considers the opportunity for designers to look at the new food networks that creative communities are building all over the world, as well as

elaborating on the Slow Food organization. The article concludes by outlining how designers can develop new arte-facts and enhance new forms of organization.

Whether and how alternative technology trajectories can be developed is further discussed in the following three articles. **Shuji Hisano** engages in a critical assessment of the impoverished mainstream discourse of biotechnology for the poor. Drawing on the work of Antonia Gramsci (hegemony and counter-hegemony) and Andrew Feenberg (democratization of technology), Hisano's analysis is part of an attempt to understand the ideological and institutional backgrounds against which alternative perspectives and institutional settings are to be developed - alternative trajectories, that is, which aim at the re-appropriation and redesign of biotechnology. Hisano continues an inquiry and debate on such issues as the democratization of technology (considered by Feenberg in the previous issue of this journal), and biopower and biopolitics (discussed by Guido Ruivenkamp in the previous issue of this journal). Hisano concludes his article with the proposition that there is an immediate need to develop discursive and institutional settings for reflexive research.

The article by **Vimala, Devi and Rao** discuss a concrete example of tailoring biotechnologies. They refer to the practice of redesigning a technology for a location-specific production of *Bacillus Thuriengiensis* (Bt) which is indeed developed within such an alternative discursive and institutional setting. In this instance, a different technology was developed by means of participatory methods (among others, allocating the power of agenda-setting to farmers) and the incorporation of such qualities as availability (not only in financial terms, but also in terms of readiness for use, leading to the concept of localized production) in the process of design. This difference is visible in the 'state of condition' of the technologies. The researchers succeeded in shifting from a liquid-based multiplication process of Bt (mostly developed by multinationals) towards the participatory development of a solid-based multiplication process of Bt. The authors explain how the replacement of liquid- by solid-based multiplication contributes to a process of re-appropriation of pest-management practices by local producers.

The final article of this issue is a contribution by **Terry Bradford** on the development of mainstream biotechnology industry in the United States. Bradford argues that the current US biotechnology industry can be thought of as the product of co-creation, shaped by the convergence of scientific, finan-

cial, and legal practices (which are in their turn mediated by legal judgments and political decisions, among other things). The article nicely shows how mainstream biotechnology industry is constituted from various practices, of which science is only one.

Guido Ruivenkamp

Joost Jongerden