

Genetic Engineering in Contemporary Art : Art in the Age of Technoscience

Title	Genetic Engineering in Contemporary Art
Subtitle	Art in the Age of Technoscience
Lead-in / Abstract	<p>Contemporary approaches to art and biology, and in particular to digital art and genetic engineering, seem to reveal a new form of collaboration between art and science. In this article I will critically explore how new art forms which emerges form that kind of collaboration, both dramatically differs from artworks which explore art and genetics through the use of traditional media. In the center of the dispute are the works of artists who left the artists studio to work in a science laboratory instead. Central to these art works emerging from the laboratory is the relationship between art and the central scientific paradigm of the genetic code, as well as the reflection on the technology of molecular biology and bioinformatics. Some artists regard the usage of the technology of molecular biology just as another artistic tool to create works of art. In my view the relationship between art and science in the age of technosciences is much more complex. The laboratory is not an isolated research context, but a complex field where humans and non-humans (objects - models - metaphors) act with each other and intermingle. In this contribution I will focus on the powerful metaphors that are part of the discourse of molecular biology today and how these metaphors become part of the discourse of the art world today.</p>
Participants and speakers	Reichle, Ingeborg (?)
Short biography of participants	Not provided.
Full text	<h2>1. Genetic Engineering in Contemporary Art</h2> <p>Today the pictorial representation of the human genome in the shape of a double helix and images of the twenty-three pairs of human chromosomes are no longer neutral descriptions of human genetic processes but rather have advanced to the status of ornaments and bearers of a mythological and religious meaning of 'life itself'. Already around 1900, early representatives of the young discipline of genetics exhibited a tendency to indulge in utopian rhetoric, conjuring up visions of a 'biological art of engineering' or a 'technology of living organisms', which did not confine itself to the shaping of plants and animals but aspired to setting new criterion for human coexistence and the organisation of human society. Then, as now, the heralds of this 'biological revolution' were predicting nothing less than a</p>

second creation; this time, however, it would be an artificially created bioindustrial nature that would replace the original concept of evolution.

In contemporary art, many exhibitions in recent years have taken as their theme the effects of this 'biological revolution' on a person's self-image and on the multi-layered interrelations between art and genetics. However, in contrast to the first encounters between art and genetics, which began in the early twentieth century with art's visual and affirmative engagement with genetics, today these 'scientific' images are being decoded through the linking of art and the images of the life sciences, resulting in a new way of reading them. Artists are taking the terminology of the realm of art and applying it to the technically generated images of molecular biology or other life sciences, thereby questioning their claim to objectivity and truth and making them recognizable as a space where other fields of knowledge and areas of culture may also be inscribed. With the aid of an iconography of images from science, an attempt is being made to decipher the cultural codes that these images additionally transport.

But in contemporary art today, we also see approaches that reveal the complex relationship between art and science, especially in the use of controversial technologies such as genetic engineering. In the last two decades we have seen a number of artists leave the traditional artistic playground to work instead in scientific contexts such as the laboratories of molecular biologists. New art forms like 'Transgenic Art' and 'Bio-Art' have emerged. These new art forms differ dramatically from approaches which explore art and genetics through the use of traditional media. Central to this kind of contemporary art is the relationship between art and the central scientific paradigm of the genetic code, as well as reflections on the technology of molecular biology and bioinformatics. In the context of these art forms artists create new 'life forms', i.e. new organisms which are to a greater or lesser extent 'technofacts' rather than 'natural' organisms. In my contribution to this panel I will ask how the production of new organisms through art challenges the perception of what is art and what is nature. I will focus the theoretical background on the emergence of art from the laboratory. Many artists today use real, transgenic organisms in their works, addressing the perpetuation of evolution by humans through the creation of novel organisms according to aesthetic criteria, processes which the advent of recombinant DNA technology has now made possible.

2. Art in the Age of Technoscience

Today the scientific laboratory—as Bruno Latour once wrote—has expanded its walls to include nature and even the whole world. So it seems obvious that artists, too, would begin to expand the realm of art to include the laboratory. In the last few years we have seen artists making their artifacts within the context of the scientific lab and even beginning to produce genetically manipulated organisms. Some years ago the Paris-based art theorist Frank Popper introduced the term Techno-Science-Art to describe a form of art that is situated between art, science and technology ¹. This new term, which places 'technoscience' in the dominant position, seems, in my view, to be a suitable meta-term for describing these emerging, new art forms. The term technoscience was introduced by both Bruno Latour ² and Donna Haraway to describe the effects of the enormous transformations in the production of knowledge in the life sciences since the beginning of the twentieth century. According to Latour and Haraway, these transformations in science will lead to a redefinition of nature and science and as a consequence the term natural sciences will no longer seem adequate and should be replaced by the term technoscience.

3. Artefacts and Technofacts

Artists turning today to the technical production of transgenic organisms, hybrids, and other technofacts, have apparently touched a raw nerve with the modern life sciences, and this is turning the transfer of technofacts from the scientific laboratory to the art world into a precarious ordeal. All the while, the laboratory methods used to manufacture these transgenic life forms are not in any way new. For three decades already, genetic engineering techniques from the field of molecular biology have made possible—thanks to the advancing mechanisation of the living—the technical reproduction or even new production of life at the molecular level. These organisms, until now non-existent in the natural human world, no longer resemble any natural evolutionary architecture and reinforce the transformation of biology lab organisms into epistemic objects. Molecular biology as well as other fields in the life sciences to a large extent construct and design the

objects of their research today themselves, thereby producing technological artefacts which owe their existence to the culture of experiment and the expanding technological systems of the laboratory. At the same time these organisms in the laboratory often now have an epistemological status in terms of knowledge models that merely serve as representational models. In this way the technofacts of the 'third nature' have, today, to a large extent replaced life forms of the first nature as the reference objects of the laboratory. Reports of experimental results as well as the discourse of research organisations are therefore primarily focussed on these manufactured, epistemic objects, whose modelling takes place within the immense science complex and the physical infrastructure of the laboratory. Such an implementation of model realities without a reference makes possible a controlled technical manipulation of the processes of life, which then leads to a denaturalisation or artificiality of the object under investigation.

The development in the 1970s of recombinant DNA technology led to a fundamental change in the way molecular structures and processes of living organisms could be made available for scientific experimentation. With the production of transgenic organisms, molecular biology moved beyond the current borders of species and subspecies that are a result of millions of years of evolutionary change, thereby shaking up the existing system of scientific classification.

From an epistemological perspective this new access to organisms represents a break with previous methods and approaches in molecular biology: Macromolecules themselves became manipulative tools of recombinant DNA technology and thus were transformed into technological entities. The nature of these is such that they are no longer distinguishable from the processes in which they intervene, and in the molecular biology lab they begin to resemble industrial production systems, becoming in effect molecular machines. As a consequence of this development the organism acquires the status of technological object; the organism or even the molecule itself becomes a laboratory. Thus molecular biology, as a central domain of biology and the life sciences, finds itself on the way to becoming a science that not only handles, dissects, processes, analyses, and modifies its subjects—life forms and the parts thereof—, but rather constructs these henceforth in a fundamentally new sense, as technofacts, which can no longer be described as biological objects of a 'natural nature'. This construction, however, does not correspond to an understanding of the production of matter as a form of 'creation' in the sense of the bringing forth or generation of life, but is rather to be seen as a process of transformation and conversion of matter.

4. Art Out of the Laboratory

In addition to exploring the methods and techniques of science, such as the adoption of scientific visualisations, texts, and instruments, model organisms of the biosciences are also being appropriated and brought into the artist's space. In this transfer, the tense dynamics within which the current technoscientific production of technofacts and the artistic creation of artefacts find themselves, become clear. With the production of transgenic organisms, hybrids, and recombinant DNA, artists have apparently arrived at a particularly painful point in the technosciences, the point at which the artefactness of nature (particularly in the context of the molecular biology lab) meets the artefactness of art, and there the relationship between art and nature—ever the deciding factor of art theory—seems to collapse.

The transfer of scientifically produced transgenic organisms from the laboratory into the artist's space in the last few years has led to passionate debates which tend to focus less on the status of such objects as works of art and much more on ethical debates about the limits of manipulation by the natural sciences of the unadulterated natural world and its economisation by business. At the same time there has been reoccurring criticism of the 'artistic' production of living organisms according to aesthetic criteria and without any considerations of use or purpose, as opposed to the work of scientists in fields such as molecular genetics or cell biology. Art was seen as transforming such life forms without legitimate purpose or reason into aesthetic artefacts, wanting thereby to rewrite the story of Creation for its own outrageous purposes. It thus became clear that the public is not yet ready to accept 'glowing dogs' and 'glowing rabbits', which are viewed as eerie and monstrous hybrid life forms not belonging—not permitted to belong—to the creature world, where their presence would lead to disarray within the traditional, ontological orders. With regards to the production of new hybrid forms in art, it seems to be less a debate about the acceptance of new art forms or shifting borders in the art world itself; much more significant are the negotiation processes of the forces shaping society, forces which can lead to the construction of very specific life forms and worlds, thereby excluding others. Living things that are manipulated and modified in laboratories for specific scientific or economic purposes, will, to a certain extent, be accepted, but not, however, in day-to-day life. This all the more so since

in the course of the mechanisation of the living it is becoming ever more difficult to determine what is still 'nature' and what is already technology, what can be regarded as real and what is imaginary; the certainties of the daily world have already been severely shaken.

While more traditional epistemological viewpoints, focussed on the idea of the organic, continue to persist in the old 'humanistic' connotation of nature, regarding nature as static, abiding, and more or less endowed with inalienable properties, and while postmodern epistemology continues to concentrate on deconstructing the accompanying classical humanistic categories, the biosciences ceased operating with this humanistically understood idea of nature some time ago. Art Out of the Lab shows the world how precarious the category of 'nature' appears today and how great the fear is that the results obtained in the laboratory with artificially created technofacts and epistemic objects will, in the Age of Technoscience, as a rule, be applied to other organisms and eventually humans. These fears, in light of the tremendous speed with which the technosciences are developing, are well justified. Furthermore, on account of the increasing amalgamation of technology, industry, and science today, one can barely distinguish between the technical, social, economic, and political factors that are responsible. The extent of the current ubiquitous 'scientification' and mechanisation leads furthermore to the situation that technology will become increasingly constitutive for social structures and processes—a situation which, according to recent scientific research, will lead to a fundamental transformation of the constitutive social structures.

The emergence of new technologies and their implementation in contemporary society is by no means a smooth process, but rather takes place within a complex and multilayered interplay of forces and interrelationships among science, technology, and society, and is accompanied by a constant process of social negotiation. In the course of these negotiations for the world of tomorrow, the life sciences in particular continue to develop new human models and are becoming increasingly involved in the social-political debates. Yet it was the emancipation of the natural sciences from such meaning-of-life questions that was one of the fundamental prerequisites for their advancement in the modern age and their increased effectiveness. The focus on answering purely analytical questions and the referral of enquiries into values, norms, and meaning to the areas of theology, philosophy, and other humanities and social science fields, formed the initial basis for—particularly in the context of economically useful results—the tremendous rise of the empirical sciences. The delegation of such questions of ethics to the humanities and social sciences in favour of the development of a purely pragmatic operating basis for the 'feasibility' and 'realisability' of theoretical approaches was one of the fundamental conditions for the powerful social position which the natural sciences have attained over the last two hundred years. For this reason as much as any, the resulting differentiation of the sciences and university disciplines led in the end to a final separation of the humanities and natural sciences as well as to an ever increasing fragmentation of a disenchanted world in which a comprehensively conceived concept of life and nature no longer seemed possible, and brought with it the splitting up of the concept of nature into numerous fragmentary aspects. In the course of this development, the concept of nature and the interpretations thereof being put forth by the natural sciences in the technological community in particular were increasingly granted an ever greater significance. In contrast to this, metaphysical ideas of nature were now disqualified as speculative, therefore non-scientific, and—above all—of no profitable use. In this manner, the history of natural research and the history of natural ideas came undone. Non-empirically structured ideas of nature became simply decorative, theory-oriented aspects of a general education in a culture otherwise shaped by the 'essential', result-oriented, intersubjectively operating natural sciences.

5. The Readability of the World

The deciphering of the genetic code brought with it an alarming unreadability of the world. The ethical and social implications, in particular, of the biosciences deserve guidance and critical review. That such guidance cannot be provided by means of classical arguments or even rhetorical discussions of morality is demonstrated by artists such as Eduardo Kac: The significance of a moral world, intended to supply a background to the life sciences, long ago gave way to a purely syntactical structure that places efficiency, feasibility, and useability at the center of natural science activities. In this process, it is particularly the mechanisms successfully implemented in this structure that seem to make an analogous, artistic treatment necessary. Indeed, artists today have ceded their motif of the *deus artifex*, the artist as divine creator, to the biosciences and biotechnology, whose practitioners have from the very beginning proclaimed it their goal to take evolution out of the hands of nature and shape it according to their own image; however it is exactly the syntactical mechanisms underlying this image that make it possible for artists

today to enter the dialogue on the objectives of the life sciences.

Consequently, the epistemological content of eminent artistic strategies, which provided a sharper look at the prematurely expressed plausibility and utilization ideologies of the natural sciences, were pursued time and again in the last decades by artists using traditional media. However, only with the artist's deployment of the actual laboratory methods and techniques of the life sciences does a certain potential open up for dialogue. In this context, the often criticised identification between artists and genetics technicians, between an art context and a science context, is therefore only at first glance a 'whatever that may be' form of identification: Only when artists utilise the same mechanisms and scientific methods are they able to counter the permanently busy and unreasonable demands of the biosciences with an equally-matched basis of action, such that artists' use of bioscience methods is specifically not seen as simply currying favour or merely imitating life science practices. It is rather a matter, only possible and acceptable in an art context, of a subversive affirmation of genetic engineering achievements, which only this way makes possible the called-for dialogue on the challenges and unreasonable demands of the biosciences. Only through art's ability to transfer epistemic objects of molecular biology into the artistic realm will the tense dynamics in which the technoscientific production of technofacts is happening, become clear. Therein appears to lie, ultimately, the reason for the apprehension that is constantly expressed by the critics of transgenic art. By bringing such artificial organisms and hybrids out of the laboratory, artists are showing the world that the 'natural' sciences in the Age of Technoscience had begun some time ago already to work with cybernetic concepts of nature, thus forcing a posthumanistic understanding of nature, the details of which, for most people, are only slowly becoming clear: the life sciences long ago opened Pandora's box, expanding the walls of their laboratories to include nature, and turning nature itself into an object for global experimentation.

■ 1. See Frank Popper: „Techno-Science-Art: the Next Step'. In: Leonardo 20.4 (1987), p. 301–302 and Itsuo Sakane: „The Historical Background of Science-Art and Its Potential Future Impact'. In: Christa Sommerer, Laurent Mignonneau (Hg.): Art@Science. New York: Springer-Verlag, 1998, p. 227.

■ 2. See Bruno Latour: Science in Action: How to Follow Scientists and Engineers Through Society. Cambridge/Mass.: Harvard University Press, 1987.