



A JOURNEY THROUGH THE WORLD OF BIOTECHNOLOGY

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INTRODUCTION

Biotechnology uses the sciences of biology, chemistry, physics, materials engineering and computer science to develop instruments and products that are at the cutting edge of some of today's most promising scientific frontiers, able to provide new opportunities to fight disease and improve our knowledge of living systems.

Thanks to the multitude of technologies being developed in various fields of application, biotechnologies are present in our everyday lives to such an extent that we are hardly aware of them.

However, this widespread use does not seem to correspond to an equally objective awareness in public opinion of the choices regarding all our futures which touch upon issues that are not always easy to grasp.

It was this that prompted us to mark the occasion of the Euroscience Open Forum 2010 by launching a project that aspires to narrow the gap between the general public and biotechnological research. To do this we will use a formula that combines didactic rigour with artistic creativity in order to explore a new artistic dimension that is beginning to spread outside the specialised channels and to stimulate intelligent curiosity and a spirit of enquiry.

"Relations with the new and disturbing field of redefining biological life again raise the problem of ethics in art and question our attitude to the unprecedented hypotheses of altering reality." ¹

Art criticism, together with bioethical and philosophical criticism, allows us to analyse this relatively unknown world that will continue to be controversial for many years.

¹ From the website <http://www.ekac.org/lorenzo.html> (text published in LORENZO TAIUTI, *Corpi sognanti. L'arte nell'epoca delle tecnologie digitali*, Feltrinelli, Collana Interzone

THE PROJECT

Following on from the innovative links forged between contemporary art and the world of science in the past few years, the project is the outcome of the collaboration between **the Foundation for Biotechnologies Italy - Life Learning Center Network, the Fondazione Rosselli, the Molecular Biotechnology Center Italy, the Institute of Genetics and Biophysics Adriano Buzzati-Traverso, the Institut of biotechnology Finland, the Ljubljana Faculty of Education, the PAV Parco d'arte vivente, Farmindustria and Assobiotec.**

All these organisations will contribute with their experience in the scientific and artistic spheres in an attempt to throw more light on a complex and hotly debated subject like biotechnology. A range of different communications media will be used in order to reach both high-school students and general public, including: a multimedia exhibition on the relationship between art and science, scientific conferences and teaching workshops.

The exhibition

The latest scientific discoveries in the field of biotechnologies have opened up a forum for an exchange of views between scientists and artists. Against a background of constantly changing lines of research, it is precisely the specific insights offered by the latter that have inspired original artistic projects with a strong social component, as can be seen, for example, in the works by Patricia Piccinini (*We are family*) and Enrico Tommaso De Paris (*Chromosoma*).



For the Outreach section of ESOF 2010, we would like to set up a multimedia exhibition in which the relationship between art and science, based on the principles of challenge and a reciprocal exchange of knowledge, will play a key role in the process of informing the public, as well as allowing viewers to explore some of the most interesting aspects of biotechnology from new and stimulating points of view.

The introductory section

This section will open with the official definition of the term “biotechnolog(y)ies” and the description of the key historical and scientific steps that have led to their development (“Major steps in the history of biotechnology from 1800 to the present”) and the various schools of thought. The historical approach is both necessary and functional since it conveys an idea of how science has constantly evolved. It also provides suitable means to allow viewers to understand the controversy and debate surrounding some applications of biotechnology.

The educational – informative display

Human development is characterised by the evolution of knowledge which has allowed us to achieve major scientific goals like the discovery of the mechanisms to transcribe and translate the gene code, to understand the metabolic pathways and alterations in the DNA sequence, all of which represent the bases from which the various biotechnology applications have stemmed.

The progress of human knowledge itself will act as the guiding thread in a display that aims to retrace the steps that led to the birth and development of biotechnologies.

By examining the following themes in greater detail, the display will start by defining the role and use of organisms in order to illustrate to visitors the possibility of intervening in the molecular mechanisms at the heart of life itself.

The topics covered

A) Traditional biotechnologies

Examples of the biochemical process will be presented to explain how the chance discovery of fermentation – caused by microorganisms (bacteria and yeasts) – provided a key ingredient in the production of wine, beer, yoghurt, etc.

B) The transition from traditional biotechnologies to modern biotechnologies, which are now set to revolutionise major research sectors.

Videos, images and 3-D models will be used to explain this important shift, which started with the discovery of DNA, the root of our genetic knowledge, and the possibilities of altering its sequence using a molecular “cut and paste” process to isolate a gene and insert it into another genome, thereby producing a genetically modified organism.

C) **A journey through DNA manipulation**

In order to provide the necessary means to raise awareness of the ongoing controversial debate about human intervention in genetic material, and the creation and use of genetically modified microorganisms, different aspects of various biotechnology applications will be presented:

- Pharmaceutical field: insulin and recombinant vaccines
- Environmental field – bioremediation: use of genetically modified plants and bacteria to treat contaminated water or soils
- Agricultural field: genetic manipulation used to enhance harvest yields from some crops (maize, cotton, rape and soya, the most widespread crops in today's world) or to produce foods enriched with particular substances, such as vitamin A in the case of "golden rice".

D) **The potential offered by research**

The artistic display

The artistic display will add another dimension to the scientific project and will help visitors understand these complex subjects. As well as offering a new and original view, the artistic part of the exhibition aims to prompt visitors to reflect on biotechnology today and of its potential effects, both positive and negative.

After a thorough period of training with the Foundation for Biotechnologies, six young artists (**Diego Scropo, Dario Neira, Laura Viale, Sara Zampedri, Samantha Mc Millan, Donato Canosa**) will create installations / works of art from a personal and artistic point of view on a specific subject-matter, provided they respect the scientific content of the application they choose. They will be supervised by biotechnology lecturers who will follow their creation step by step and by important artists as Piero Gilardi and art critics as Franco Torriani.

Teaching workshops

The progress of knowledge in the field of Life Sciences has led to the development of new technologies and their broad-ranging application in health, food production and the environmental sector.

Against this background of continuous development, the spread of a scientific culture and expertise takes place through a process of innovative teaching methods that see practical workshop activities as a key element for effective science communication.

For this reason, the Foundation for Biotechnologies will flank the educational display in the exhibition with a programme of teaching workshops for schools and the general public on biotechnology-related themes: DNA extraction and analysis, use of the computer to reveal the mysteries of the genome, in both living organisms and fossils, and design new molecules of pharmacological interest and biodiversity.

The teaching workshops will be organised and equipped to allow participants to acquire direct experience of the test activities. The hands-on activities will be guided by a tutor selected from postgraduates and graduates in Biotechnologies and other Life Science faculties with teaching experience, as well as other young researchers actively involved in projects from the various Life Science sectors.

Lectures

Lectures will be held to encourage an informal atmosphere of discussion between the public and researchers.

They will focus on clearly defined themes and will be given by one or more speakers coming from Italian or International University or research institute with the aim to interact directly with members of the public.

This type of approach will create a direct and active dialogue between anyone interested in science and people who actual work in science.

Generally, the lectures will start with a short introduction that will then provide the basis for a discussion for the public. Moreover, a journalist or other presenter will be invited to chair the debate.