

AS A EDITORIAL: BIOTECHNOLOGIES AND SOCIETY

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We are living interesting times. Beyond a doubt the last centuries have witnessed radical changes in mankind's way of living or, better said, in the richest part of humanity. Many believe that modern science is responsible for this new way of seeing the world and approaching, not to an immutable truth but to an always provisional although effective certainty. This new way of obtaining knowledge came to life in the 17th century with Bacon's inductivism and Galileo's experimentations and mathematical resources, to be complemented later with the advances in the modern system of publicity and critique, which today are considered a part of science.

Precisely due to science and technology, the last centuries have witnessed an exceptional acceleration in the factor of change. A change that affects the lives of each and every one of us.

Five centuries ago, and undoubtedly during the greater part of the history of mankind, it was customary that a person's life experienced little change within their world from childhood until the end of his or her days. The change in daily life over a hundred year period was hardly perceptible. Novelties were developed very slowly.

At present science and technology generated innovations are introduced year after year. Alvin Toffler in *Future Shock* (1970) reminds us that we have to learn to live with change, with clonic sheeps, computers which beat human chess masters and the never ending list of gadgets modern technologies offer us. All of which decidedly change our lives.

We are living interesting times, of change and possibilities, of new problems. The ancient Chinese curse says *May you live in interesting times*. And it is, let us remember, a curse; living interesting times is, at the very least, tiring.

It is true that all change provokes a certain dread. According to Bertrand Russell, "each of the advances of civilization have been considered unnatural as long as they were recent". We know the need to learn how to live in the future and, overall, to live with the future.

Faced with machines and the most recent technological results we have always had a strange reaction. On the one hand we build them and try to enjoy them, and on the other we worry just how far they can go. Two hundred years ago, vapor powered machines were a surprising and important change. Reactions, like those of the Luddites who destroyed machines in order to safeguard human jobs, may even appear logical. Today, automatic movement of an inert body is not considered strange. Now, it is another type of techno-scientific results that worries us.

Progress and Technological Evaluation

Success of modern science born in the 16th century brought encyclopedists in the latter half of the 18th century to try to contemplate the world through the powerful and exclusive eyes of reason. Progress, the possibility of a change towards the "perfectibility" of mankind, began to be a true possibility on an earthly scale.

Until then the only progress attainable was in the next life. From the Christian heaven and hell to the Hindu possibility of a better reincarnation for those that had followed the rules, there was no possibility of earthly advancement until Condorcet associated progress with the possibility to know more (science) and the ability to have more artifacts (technology).

Indivisible from the socio-economic capitalist reality, the 19th century showed blind faith in material progress based on science and technology.

Despite worry generated by the use of mustard gas during the First World War, it can be said that the majority of people continued to believe in progress during the first half of the 20th century. Things changed, however, after the Second World War and the detonation of the atom bomb, the posterior problems with DDT, public concern about global warming and climatic change, the effects of CFC's and their relation to the hole in the ozone layer, protection of biodiversity, and a long etc. All of this has led us to think that it no longer makes sense to throw ourselves into the hands of science and technology and their capitalism biased progress. The results attained by the capitalist use of techno-science has shown the necessity of controlling technological development and that before acritically accepting the new techno-scientific possibilities offered, it is necessary to try to find out where it will lead us.

If technology and its artifacts are changing our daily lives, the convenience of making previous studies to foresee its impact is understandable. This technology

assessment is only begun to be spoken about in the 1970's. It is no longer only medical doctors, sworn to the hippocratic oath, but all scientists and engineers involved in the enormous transforming capacity of science and technology who should be obliged to behave according to a code of ethics. After the atomic bomb, it is evident that the stakes are too high, and we are all playing.

Despite all of this, technological evaluation itself is very recent and presents certain problems. Thinkers like Neil Postman had brought up the fact that nobody ever analyzed the social impact and the technological effects of, for example, the automobile introduced at the beginning of the 20th century and today completely omnipresent. We have not known how to make this analysis until now.

In recent years, the voracious absorption of today's mercantized society seems to have already incorporated the need to respect the environment. In direct opposition to Postman's example of the automobile, the vast majority accept that the possible environmental impact of a new technological invention must be evaluated beforehand. But this is only a superficial approximation, limited in what would be convenient for a true technological evaluation.

In the 1930's Ogburn spoke of how human beings were immersed in three complementary and interrelated fields. On the one hand there is the *environment*, nature in whose bosom we live. We are also endowed with a *social medium* with its structures of personal relationships, which we build and consolidate throughout our lives. And finally, as toolmakers, humans create our own *technological environment* in order to complement what nature has put at our disposition.

A good technological evaluation should consider all these aspects, in transdisciplinary investigations, a desideratum which today would still be far from reality. Nevertheless, this is the road to follow.

The biotechnologies

Within the abundance of recent technological novelties, the so called life sciences are having spectacular success and outcomes.

During the last fifty years, the improvements in medical science and technology have made possible a surprising reduction of mortality rates and have brought about the possibility of curing a number of diseases that were fatal only a century ago. The increase in life expectancy has resulted in an exaggerated growth of the human population, adding that to already existing problems.

The improvements in general medical technology are for the most part incorporated in the new perspectives with which we now contemplate the world and its possibilities. The current novelty is the multiplicity of new applications that have appeared since we began to find out about the structure of live matter, the DNA of proteins, being able to interfere and modify them at will, as mankind has been doing since time out of mind with the environment.

Fortunately or otherwise, we are no long just dealing with inanimate nature. What is within our reach today is the possibility to alter life, that life that evolution has been constructing little by little throughout time with no explicit orientation.

For the first time in history, humanity's accumulated knowledge allows us to modify ourselves, assuming the role of creator or of evolution itself, enabling us to pass through stages of development at an unimaginable rate.

A few years ago, even before the public presentation of Dolly in February 1997, Mark Harrison filmed a documentary about technology and its effects on society. *Voices from Heaven and Hell* (1994 - Channel Four), was broadcast in Spain on Canal Plus under the title of *At the Doors of the Millennium*. Fear of the future in the new millennium was analyzed along with the security technology can offer faced with the times to come, along with other problems old and new. Concentrating mainly on information sciences and genetic engineering, the documentary closed with a quote from Stephen Hawking:

In the last 10.000 years we have accumulated information more and more quickly, which has then been passed on to the next generations. This transmission of information communicated through language has substituted biological ADN evolution, which has experienced no significative changes during the same period. We can not continue much longer with this exponential growth of information, as our brain is essentially the same as that of a caveman. Despite this, we are at the doors of a new era in which we can modify our DNA, our intellectual capacity and life expectancy. I only hope that we use this power wisely.

Manipulation of the human genetic code is only one of the many options offered by biotechnology, along with the modification of animals for use in organ transplants (xenotransplants), seed alteration for crop adaptation (transgenic products), and a long list of unsuspected possibilities.

The problem is that when we speak of technologies and their effects the only reference we have is that of the capitalist socio-economic system that has directed the scientific and technological discoveries during the last centuries. A system that, despite corrections by Keynes, has generated values that reject solidarity in favor of competition and impose economic gains over any other consideration.

More than 30 years ago, Umberto Eco talk about apocaliptics and integrated in terms of mass culture, and now, with biotechnologies we are faced again with the same situation. As Russell reminds us, all progress has been considered anti-natural in the beginning. The apocalyptic view appears to dominate but it is possible that no one would dare to renounce advances such as the increase in life expectancy. On the other hand, the search of the capitalist market for immediate profit is no exaggera-

tedly in accordance with the system, that it appears to be the fruit of complete thoughtlessness.

Technology has always been a two-headed beast, a Janus who offers, as Mark Harrison states, both positive and negative applications. They are two complementary views which cannot be isolated.

The journal

The Editorial Board of *Sostenible?* decided to concentrate on the subject of biotechnology in its second published issue. With the kind collaboration of Anna Monjo, of Editorial Icaria, this issue has been composed of diverse views on biotechnology. Being not a specialized journal, we are starting off with a first part that tries to explain just what biotechnology is (*Introduction to Biotechnology*). We follow up with a general reflection on the social evolution of technologies, overall with attention to potential risks represented by biotechnologies (*Evaluation of Biotechnology*). We cannot forget a view directly associated to the character of the use that is made, or is thought about being made, by the socio-economic capitalist system, a use that already produced unfortunately many troubling examples (*Biotechnologies in the Capitalist Market*). We have wanted to close the journal with one contribution to the social and ethical debates on biotechnologies. Two global reflections are incorporated, from the ethical point of view and from a worldview which contemplates the reality of a planet with a scarce «pocket of wealth» in an immense amount of poverty, which we call the Third World, although it is the first, numerically speaking.

As in the first issue of the journal, here there is also lacking the abstracts. Given the situation, we have decided to present each article with a text which evidently is the sole responsibility of the Editorial Staff. As always, we close this monographic issue with documents and bibliographical references (always accesible through the Collective Catalog of the Catalonian Universities), and the list of forthcoming conventions and scientific roundtables on the subject.

As a certain Kind of finishing

As says the ancient chinese curse «May you live in interesting times!». And it is a curse, remember it. Not everything is good in biotechnologies, neither everything is bad. The problem is that we need to separate wheat from straw and, when possible to imagine what could be done with a technology so powerful as technology if it could develop outside the greed and the competitiveness so characteristic of capitalism. But this it, today, just science fiction. As it has been, during longtime, the same biotechnology that built the brave new world that Huxley showed to us in 1932. If biotechnology reached to be a possible reality, perhaps tomorrow the end of capitalism becomes also a reality.