

Articoli/Articles

BIOMEDICAL BIOTECHNOLOGIES
IN THE ITALIAN PUBLIC SPHERE

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SUMMARY

The aim of this paper is to examine the interpretative models that shape current debate on biotechnology, with particular reference to biomedicine and to the Italian situation. It is devoted to show how the evolution of the biotechnology debate involves various interpretative schemes able to account for the various roles played by the various social actors involved. It is also possible to single out a number of persistent themes which encounter specific events and give them particular significance. Once triggered it is a process of mutual reinforcement: on the one hand, similar events acquire value and visibility because they encounter these themes; on the other, these events enable the underlying themes to acquire material and visible form and thus be perpetuated. The arena in which this encounter between underlying themes and specific events takes place, and where the various interpretative schemes can be observed in action, is the public space constructed by the media.

It is now beyond doubt that we are living in the century of biotechnology. Both those who see in it an enormous potential for humanity in its wholeness, and those who fear catastrophic consequences, agree that biotechnological research and its applications are the distinctive feature of the present age.

However, as soon as we try to go beyond this general consensus we find that the idea of the 'biotech century' assumes different and sometimes contradictory meanings. We frequently do not take into consideration that these differences stem from cultural patterns whose origins are often difficult to determine and whose characteristics are difficult to define.

Key words: Biomedical biotechnology - Media - Public-sphere

The aim of this paper is to examine the interpretative models that shape current debate on biotechnology, with particular reference to biomedicine and the Italian situation. Because this is a preliminary analysis it can be neither complete nor definitive, and the concrete cases cited serve as examples rather than detailed accounts of the events relating to them.

The approach used is based on the conviction that the evolution of the biotechnology debate displays various interpretative schemes able to account for the various positions taken up by the various actors involved. It is also possible to single out a number of persistent themes – for example pollution and body modification – which encounter specific events and give them particular significance. Once triggered it is a process of mutual reinforcement: on the one hand, similar events acquire value and visibility because they encounter these themes, which constitute a sort of ‘invisible weave’ within society; on the other, these events enable the underlying themes to acquire material and visible form and thus be perpetuated.

The arena in which this encounter between underlying themes and specific events takes place, and where the various interpretative schemes can be observed in action, is the public space constructed by the media. The media public sphere is therefore particularly important for the observation of the cultural models that inform the debate on biotechnology. Within it, numerous social actors position themselves and interact on specific questions (called ‘events’ here) which relate to more general and persistent issues (‘themes’). They use interpretative schemes which, since they are of general application, can be repeatedly utilized, and therefore form a repertoire they can draw on when necessary. The paper concentrates on these aspects, but does not neglect other areas, i.e., institutional or more strictly scientific ones.

However, this perspective requires two further specifications. Firstly, one should not confuse the media public sphere with public opinion.

‘Public opinion’ corresponds to the *set of attitudes, beliefs and judgements which people express with regard to various issues and which orient their behaviour*. It is unquestionable that – es-

pecially in the societies of the post-industrial West – the media play a crucial role in shaping public opinion, but they do not completely overlap. The ‘media public sphere’ is more a *place for discussion consisting of the media arena in which a variety of social actors confront each other on issues of public importance*¹. This is not a neutral space, however, since the media too are actors, and enter the game as proponents of particular point of view.

Secondly, it should be borne in mind that what is kept separate in other domains – for example science or law – in the media constitutes an undifferentiated flow in which everything merges together, although this does not entirely preclude identification of interpretative models, recurrent themes, actors and events. This situation makes analysis difficult; the difficulty is though compensated by a wealth of insights, and lots of interconnections which would be less visible and maybe overstated in other contexts.

1. *Biotechnology: an old story*

In its broadest sense, the term ‘biotechnology’ denotes a set of practices which alter biological processes in order to obtain goods or services. There is no doubt, therefore, that biotechnology represents one of the many ways in which mankind has manipulated the environment. Fermenting grapes to produce wine, adding yeast to dough to make bread, or cross-breeding vegetable or animal species to suit man’s dietary needs: these are all biotechnological practices. The idea recalls one of the arguments in defence of biotechnology: if ‘we’ve always done it anyway’ why should we stop now, just when the development of scientific and technological knowledge allows us to achieve more rapidly and with greater chance of success what we have always sought to do, namely bend nature to our needs, alter it so that we do not have to alter ourselves, or ensure our survival in even the most hostile environments?²

But it is precisely the power of the tools that science makes available to us, together with the rapidity of the changes that their use may provoke, and the uncertainty of their medium-to-long outcomes, that are cited by the opponents of biotechnolo-

gy in the narrow sense, that of genetic engineering³. In this case, biotechnology is 'an old story' not at all, but rather an unprecedented and overwhelming novelty. I shall return to this point later.

What I would like instead to emphasise from the outset is that the 'innovative' biotechnology – as it has been called since the discovery of recombinant DNA in the second half of the 1970s – is an 'old story' if one considers it from another perspective.

The way in which the biotechnological 'problem' has been framed seemingly springs from questions as old as humanity itself and in large part related to the problem of man's identity – individual and cultural and as a species. In this respect, the relatively recent debate on biotechnology can be interpreted as yet another expression of questions which intrinsically pertain to *homo sapiens* and have accompanied the species since its origins. Nothing new, therefore, and yet entirely new: ancient questions about mankind but formulated in a radically different context, old issues addressed using a new language.

2. An event that has passed almost unnoticed: Asilomar

The Asilomar Conference of 1975 can be taken as the moment when the debate on biotechnologies began. Discussion about the possible risks of DNA recombinant technique initially focused on the safety of laboratories and of the people working in them. But it soon moved beyond the boundaries of the academic community into the public domain, where it involved not only scientists but politicians and ordinary citizens as well.

The best known and documented cases are those of the University of Michigan at Ann Arbor, and the city of Cambridge surrounding the University of Harvard, both in 1976.⁴ With obvious simplifications, it is possible to single out three features of this first phase of debate on biotechnology: (i) the central role of scientists in promoting it, albeit in largely indirect manner because their main interlocutors were other scientists, and because communication took place mainly through channels internal to the scientific community; (ii) the importance of the media in extending the debate beyond the circle of scientists and stoking

public interest, especially through mediation by politicians and environmentalist pressure groups;⁵ (iii) the interest of the institutions, both local and national, in defining a regulatory framework which would reduce research risks to the minimum.

Unlike the United States and Great Britain during the second half of the 1970s, Italy saw no public debate on the possible risks associated with the use of recombinant DNA technique and on the opportuneness of – or necessity for – normative intervention. That the Asilomar Conference and the debate on the safety of genetic engineering had repercussions in Italy was almost entirely the work of Vittorio Sgaramella, a molecular biologist who was then working at Stanford. This latter aspect is of particular importance. Sgaramella had attended the Asilomar Conference, but as a representative of the American scientific community, not of the Italian one. This obviously did not prevent him from informing Italian public opinion about what was happening elsewhere, but his efforts were not enough to spark debate. He wrote as follows in an article published by *Corriere della Sera*:

*"... these events have been widely discussed around the world, but they have been substantially ignored by the media in Italy, which, with rare exceptions, usually do nothing more than taking genetic engineering as an allegory, as a simile for the most pernicious evils (dioxin, for example). And it is also for this reason that, whereas for years legislative bodies and companies in more technologically advanced countries have shown much interest in genetic engineering, only now in Italy are these matters beginning to attract the attention of public and private bodies"*⁶.

The absence of public debate in Italy on genetic engineering and the total lack of interest in the political arena warrant at least some explanation, albeit only cursory.

2.1. A first consideration is that Italy suffers from a chronic backwardness in scientific research, as testified by the meagre public and private resources invested in the sector. This happens both in general and in the specific case of genetics, even though Italy has a number of outstanding research centres as the International Institute of Genetics and Biophysics of Naples. More-

over, precisely while other countries were embarking on exploration of the avenues opened up by the discovery of recombinant DNA, Italian scientific research was going through one of its most difficult periods. The crisis that hit Italian research centres, both public and private, at the end of the 1960s severely affected subsequent developments and generally hampered research work, amongst other things because of an overload of bureaucracy⁷.

2.2. At the same time, the Italian environmentalist movement – together with a more general cultural awareness of ecological issues – was less developed than in other countries.⁸ And the attention of the environmentalist movement was almost entirely focused on the problems of energy and chemical pollution⁹.

As regards to the former, between 1975 and 1976, i.e. two years after the oil crisis of 1973 which for the first time raised the concrete possibility that petrol might suddenly become a scarce resource, a new energy plan was published which envisaged the construction of twenty new nuclear power stations in addition to the small ones already operating at Latina, Garigliano and Trino Vercellese. In many Western countries, the use of nuclear energy to produce electricity was a well-established reality. But it was not in Italy, where the nuclear option had always met with strong resistance, raised especially by competing industries and above all the petrol companies¹⁰. Towards the end of 1975, articles began to appear in *La Stampa* and *Corriere della Sera* reporting on the heated controversies under way in the main European countries and the United States on the safety of nuclear power stations. But at the end of 1976 and the beginning of 1977, it was the protests of local residents and the environmentalist movement that brought opposition against nuclear energy to the attention and to the top of the media agenda¹¹. Yet subsequently, in the second half of 1976, the overriding concern of public opinion became chemical pollution. On Saturday June the 10th, reactor B at ICMESA, a small chemicals plant owned by the multinational Hoffman-La Roche, released a cloud of dioxin which spread over the towns of Brianza, Seveso and Meda, causing the hospitalization of numerous children

with skin lesions, mass death of animals, and damages to vegetation. The Seveso accident, besides becoming the key factor in social alarm over chemical pollution, helped decisively to shape and consolidate two aspects relative to the harmful consequences of man's alteration of uncontaminated nature, aspects which later came to dominate public debate: (i) the unpreparedness of the public institutions to deal with accidents of this kind, and therefore their substantial inability to protect citizens; (ii) the link automatically established among risky manipulation, economic profit and therefore the interests of the multinationals. Events like the explosion of the Chernobyl reactor and the Bhopal disaster – to cite perhaps the two most representative examples – further reinforced these two components in the interpretative schemes used in public debate.

2.3. It should also be known that the Italian left parties only later took the environmentalist movement on board, having initially looked at its conservative criticism toward science and technological development with suspicion – if not open hostility – interpreting it as a dangerous strategy liable to reinforce social inequalities and prevent the access of the less well-off classes to the new opportunities offered by progress.

In Italy, moreover, there were no organizations of scientists driven by a critical view of science – like *Science for the People* in the United States¹² – nor an authoritative consumers' movement which would raise questions about the safety of new technologies.

3. *Biotechnology equals genetic engineering*

An interesting aspect that emerges from retrospective analysis of the Italian public debate on biotechnology concerns the manner in which the meaning of the expression has been progressively collapsed into that of 'genetic engineering'.

As well evidenced by recent research¹³, the two expressions are now used synonymously in both public opinion and the media; but this has not always been the case.

At least until the beginning of the 1980s, in fact, not only the two terms were used with different meanings, but 'biotechnolo-

gy' was almost always utilized in its broader sense. Thus, while an article published by *L'Espresso* in 1981 still talked only about genetic engineering and genetic manipulation, and not about biotechnology¹⁴, an article published by *La Nuova Ecologia* in 1987 referred separately to genetic engineering and biotechnology, giving the latter a more general meaning which differed from the former but subsumed it¹⁵.

Etymological questions aside, the progressive merging between the meanings of the two expressions is of a certain importance because it highlights a recurrent feature in the interpretative schemes used in the debate on biotechnology. Whilst both expressions share the idea of manipulation – not by chance, genetic manipulation has been and still is used synonymously with genetic engineering – genetic engineering also conveys the sense of an artificial intervention which goes much deeper until it affects the very roots of our identity. Consequently, when biotechnology takes the place of genetic engineering in everyday language, it adopts from its semantic field the notion of a manipulation which is not only artificial but also somehow touches upon the fundament of human identity.

This meaning has so firmly established itself that the distinctions still drawn today by environmentalists¹⁶ or experts¹⁷ are ignored by normal language, both in everyday life and the mass media. Likewise, reassurances as to the safety of biotechnology which refer to manipulation as 'non-dangerous' and indeed useful because it is connected with the broad meaning of biotechnology – i.e. the already-mentioned strategy of 'we've always done it and it's only been beneficial' – fail to have the hoped-for effects because the term is automatically associated with genetic engineering. Indeed, at least in the mass media, the association between 'biology' and 'biotechnology' is a commonplace so that one can hypothesise a sort of semantic short circuit of the following type: biology = biotechnology = genetic engineering = manipulation.

4. *The central theme: identity*

At the end of the 1970s and in the early 1980s there occurred a series of events of particular importance for understanding the leitmotifs of subsequent debate on biotechnology.

In 1978 Louise Brown, the first 'test-tube baby', was born, an event greeted by the media and public opinion with a mixture of excitement, hope and fear. As has been pointed out, this reaction reflected the typical ambivalence shown in the past towards similar events,

*"but the contrasts were more sharply drawn this time than before. The event from a personal perspective was seen as a good news, from the parents and the researchers. (...) While the achievement of an in vitro infant appeared good news in the present, it mobilised all the familiar fears about the future"*¹⁸.

These concerns also applied to the reaction in Italy, and were confirmed some years later when, in 1983, the first Italian test-tube baby was born. It is evident that these are events which relate closely to the themes of sexuality and human reproduction.

But even more interesting is the fact that the development of genetic engineering and advances in artificial fertilization proceed *pari passu* and that their ways have always been inextricably bound up with each other – to the point that they can be considered different expressions of enduring cultural themes centred on the crucial problem of identity, on its construction and conservation¹⁹.

Having identified the nexus that links genetic engineering with artificial fertilization via the theme of identity and its potential manipulation, another important linkage emerges. The binomial 'identity/manipulation', in fact, is a key element in the interpretative schemes deployed when both biomedical and agro-food biotechnology are discussed: in the former case, the question is the transfer of identity from one generation to the next ("we are because we reproduce", because we can prolong our existence through our offspring), in the latter it concerns identity with respect to maintenance of individual integrity ("we are because we eat and we are what we eat").

In regard to reproduction, identity is tied to sexuality, for

*"it is through sex (...) that each individual can have access to his own intelligibility (...) to the wholeness of his body (...) to his identity"*²⁰.

Moreover, the association of sexuality and reproduction weds itself to the increasingly accredited cultural association between identity and genetic heritage. In our society, in fact,

*"DNA has assumed a cultural meaning similar that of the Biblical soul. (...) This entity persists when the body is gone and, containing all its essential elements, can be used to bring the body back (...) This independent entity is also central to identity or selfhood", and all these characteristics are attributed to DNA*²¹.

As for the interweaving between food and identity, suffice it to point out that

*"food and eating are central to our subjectivity, or sense of self, and our experience of embodiment, or the ways that we live in and through our bodies, which itself is inextricably linked with subjectivity"*²².

And perhaps we should also remember, following Mary Douglas's analysis, that we have *"to see in the body a symbol of society, and to see the powers and dangers credited to social structure reproduced in small on the human body"*²³.

The fact that the question of identity is central to the debate on biotechnology in both the biomedical and food sectors seems to diminish our ability to understand the interpretative models used, rather than increase it. The question of identity seems to be made up of a welter of ideas, dimensions and aspects which make it resistant to repeated attempts to define it – or to transform it into a formula which our capacity for analysis is able to handle – in the course of history²⁴. Any way it is precisely this feature that makes our perception of identity particularly sensitive to recent developments in molecular biology: almost as if the elusiveness of our identity were the hallmark of its uniqueness, of what makes us different from other living beings and therefore eligible for particular privileges.

From this point of view, biotechnology (i.e. genetic engineering and its association with artificial fertilization) evokes fear and suspicion because it holds out the possibility of 'creating' human beings at will. It suggests that man is nothing but a machine, an organized set of biological components, the diversity

of which is merely the fruit of our imagination, of our culture, and has been bred by our ignorance of the ultimate processes of life. Revealing the latter would strip the veil from human uniqueness; it would be the "final disenchantment". Genetic engineering arouses horror *"not because of the importance of its practical applications but because of some sort of metaphysical horror, the fear that the man who creates man will lose the cultural ghost of God"*²⁵.

Biotechnology are thus interpreted – perhaps not completely wittingly – as the most concrete expression of one of the principles inspiring contemporary biological research: that of "the unity of life". Because of this principle, molecular biology seems to strike at the heart of the presumed 'diversity' of the human species and therefore at the roots of our identity:

"with the advent of genetic engineering in the 1970s, the unity of the living world was proven to a point not previously imaginable. All the creatures that inhabit this earth, whatever their environment, size, or means of subsistence – snails, lobster, fly, or giraffe – all turn out to be created from molecules that are more or less identical. (...) The diversity of life forms results from small changes in the regulatory systems that govern the expression of the genes".

And moreover: *"genes and proteins are no longer unique objects, idiosyncrasies particular to a species. Structures look very much the same from one species to another"*²⁶.

As a consequence, if in general the *hubris* is an excess producing disorder, in the case of biology it consists of an excess of knowledge which jeopardizes the 'natural' order of the world.²⁷ And if our idea of 'nature' contains the core of our diversity, then defending 'nature', conserving its inner features and subdivisions, for example those among species, means defending our identity, repulsing the assault of the 'final disenchantment' that would reveal its fragility.

It is as if biotechnology, on the one hand by showing us what we are made of, and on the other by enabling us to modify our genetic essence together with that of other species, severely tests the classification elaborated by our culture to impose order on the world – a classification, moreover, which places us in a

category which excludes all others and makes this uniqueness the ground for our superiority.

Social reality is constructed by means of classificatory systems which define symbolic and social differences and thus enable structure to be given to the world. Society

*"is possible only if the individuals and the things that make it up are divided among different groups, i.e. classified, and if these groups are classified in relation to each other. Society therefore presupposes a conscious organization of itself that is nothing other than a classification"*²⁸.

All the systems of classification, with the symbols and rituals that derive therefrom, give rise to distinctions that constitute the central feature of culture, namely its capacity to act as a guide for self-awareness and behaviour, to impose order on the world²⁹.

5. *Odd alliances*

The foregoing discussion of the question of identity and the need to preserve the "natural" order which sustains it helps shed light on what otherwise is a somewhat unusual *coincidentia oppositorum*. I refer to the joint opposition raised by sections of the environmentalist movement and components of the Catholic hierarchy against human body manipulations (genetic engineering, artificial fertilization, and embryo research) and the idea of the neutrality of science: two further themes which recur in the Italian debate on biotechnology.

In many respects, this more or less explicit alliance is striking. How can it be so, in order to defend nature against biotechnology, the environmentalist movement ignores the many issues in dispute with the Catholic Church: abortion, for example, or the idea that only a family formed by marriage is the legitimate and 'natural' context for procreation, or the conception of the man/nature relationship where Catholic doctrine ascribes the former a dominant role over the latter?

For that matter, perplexity has also been expressed by the protagonists: for example in April 1987, when a number of environmentalists declared their support for opinions put forward by Cardinal Ratzinger in February³⁰.

The reply by Alexander Langer to Rossana Rossanda's indignant reaction is indicative:

*"If we want – as I believe we should – to halt the rash violation of that threshold and to counter the inexorable advance of the powerful new masters of the 'bios', of life, we must unite all the forces that can and wish to pursue this goal. The Catholic Church and its hierarchy is able to exert – certainly not on its own – decisive or at least telling influence in this regard. The Church's (certainly not exclusive) concern to defend life, and its ability to win over millions and millions of minds and numerous institutions, are unequalled resources in this battle, which so many have not yet intuited or understood. I do not believe, and however happy I would be at some sign of repentance or 'conversion' by the Church (as all of us would be ...), I do not feel that I can reject, or not seek, joint dialogue and commitment between those who share such important goals"*³¹.

At work in the tormented alliance between the environmentalist movement and the Catholic Church is a further interpretative model constantly used in the Italian debate on biotechnology. This model centres on the idea of the "sacralization of nature", although the assumptions obviously differ on each side: lay for the environmentalists, religious for the Church. But in both cases, one discerns – in the light of this reference to the sacred – the mechanism that Durkheim identified as functional to the existence of society and individuals: maintenance of the social order (that is, the set of classifications which organize relations among people and with nature) on which our identity is based, confining it within the inviolable precinct of the sacred.

6. *Recurrent patterns*

That the question of identity – closely connected with sexuality and the sacrality of nature – is a recurrent theme in Italian debate on biotechnology is further demonstrated by the fact that the recent debate on stem cells has been organized along lines similar to those examined thus far.

Also in Italy the debate was sparked in the media public sphere by the decision of the British government to follow the recommendations of the Donaldson Committee. The various positions taken up in the debate have structured themselves along two main axes which consist of two distinctions:

(a) between the production of totipotent cells through embryo cloning by means of the nuclear transfer technique ('therapeutic cloning') and cloning for reproductive purposes ('reproductive cloning');

(b) between 'pre-embryo' and 'embryo', a distinction for that matter already used by the Warnock Report (1985) and taken from the Human Fertilisation and Embryo Act (1990).

According to whether or not they recognize the possibility of maintaining these distinctions, the various actors involved have taken up different positions in the debate on cloning and the use of stem cells from embryos.

It is not difficult to relate this interpretative model to the ones already discussed. Those who believe that the two distinctions are valid employ them to mark out the boundary within which it is possible to act without harming the sacred order that protects our identity. Those who instead maintain that the distinctions are not sufficiently sound or clear-cut, reject therapeutic cloning and the use of embryos for research as a breach of that order. This latter is the case of the environmentalists, for example, who once again find themselves closely aligned with the Catholic position.

The arguments adduced by the supporters of the first distinction – those, that is, who are favour of therapeutic cloning – hinge on the belief that therapeutic cloning will not create a dangerous precedent for the use of the same technique for reproductive purposes. The claim is that reproductive cloning is pointless, inefficient and impossible, at least in the short term. The first two arguments are based on a criterion which is almost always left implicit, but it is not for that reason any less cogent. This criterion envisages the objective of reproductive cloning as the creation of individuals identical with their (only) parent. But recognition of the irreplaceable role of the environment in determining personal identity makes reproductive cloning ineffectual and therefore pointless. Moreover, doubts as to the scientific value of the experiment which led to the birth of Dolly the sheep, and anyway its inefficiency (1 positive result after more than 200 attempts), obviously rule out the technical feasibility of reproductive cloning³². Added to this is the forceful condemna-

tion of reproductive cloning on ethical grounds expressed by scientists and the British government in the light of the recommendations of the Donaldson Report.

It should be pointed out that the arguments treated are the same as those used by scientists who joined the debate on cloning arisen after Dolly's birth in 1997 in order to defend the continuation of research, distinguishing for the purpose between animal cloning and human cloning³³. This distinction corresponded to the positions taken up in the scientific debate provoked by the man/monkey affair ten years previously, when in May 1987 it was claimed in an interview that American scientists were trying to fertilize monkey eggs with human sperm to produce humanoids to perform heavy/dangerous work or provide organs for transplants. All the scientists who pronounced on the matter not only expressed sharp ethical condemnation but rejected the claim as technically impossible and scientifically nonsensical³⁴.

A further episode confirms that the therapeutic/reproductive and pre-embryo/embryo distinctions mark out the boundary (obviously for those assuming their validity) between the sphere of human action and the domain where identity merges with reproduction and the natural order. When Pavos Zavos and Severino Antinori announced that they were ready to use cloning to 'cure' genetic reproductive pathologies, they provoked a unanimous chorus of condemnation³⁵. By proclaiming themselves in favour of therapeutic cloning, Zavos and Antinori had therapeutic and reproductive cloning coincide, thereby arousing the hostility of those who saw this as breaching every moral principle, and of those who base the legitimacy of scientific research on their distinction.

Overcoming these distinctions means invading the 'sacred ground' of our identity – individual, cultural and of the species – and jeopardizing the classification that underpins the social order.

And whether this risk really is worth to be taken – for example because it is deemed useful for the development of new therapies – scientists are not authorized to take a decision on their own³⁶. The lay public demands to be involved, to be given time to understand what is happening, and refuses to be excluded

from decision-making processes³⁷. Otherwise it prefers to adopt a stance of outright rejection.

The recourse made to the 'zero risk' option – this being another element which appears with a certain frequency in the Italian debate – perhaps becomes clearer if viewed in these terms. Rather than being dismissed as a mere epiphenomenon of a rampant irrationalism, it can instead be read as a legitimate strategy with which to defend the boundary beyond which we no longer know who we really are.

BIBLIOGRAPHY AND NOTES

1. On the concept of the public sphere see HABERMAS J., *Strukturwandel der Öffentlichkeit*. Neuwild, Hermann Luchterhand Verlag, 1962; CALHOUN C., ed., *Habermas and the Public Sphere*. Cambridge (MA), MIT Press, 1992. On the media as a public sphere see, amongst others, THOMPSON J. B., *The Media and Modernity*. Stanford, Stanford University Press, 1995; HILGARTNER S., BOSK C., *The rise and the fall of social problems: a public arenas model*. American Journal of Sociology 1988; 94: 53-78; MEYROWITZ J., *No Sense of Place: The Impact of Electronic Media on Social Behaviour*. New York, Oxford University Press, 1985.
2. A good example can be found in an article by BONCINELLI E., "Ogm? Una volta li chiamavamo incroci". *Il Sole 24 ore*, 3 June 2001, p. VIII.
3. See e.g. RIFKIN J., *Entropy. A New World View*. New York, Viking Press, 1980; HO MAE-WAN, *Genetic Engineering. Dream or Nightmare?* Dublin, Gill & McMillan, 1999; TAMINO G., PRATESI F., *Ladri di geni*. Roma, Editori Riuniti, 2001.
4. For a detailed reconstruction and analysis of these cases see KRIMSKY S., *Genetic Alchemy. The Social History of the Recombinant DNA Controversy*. Cambridge (MA), MIT Press, 1982. See also WRIGHT S., *Molecular Politics. Developing American and British Regulatory Policy for Genetic Engineering*, Chicago, The University of Chicago Press, Chicago 1994; GOTTWEIS H., *Governing Molecules: the Discursive Politics of Genetic Engineering in Europe and the United States*. Cambridge (MA), MIT Press, 1998; and for further details and for discussion of other cases of public debate on genetic engineering see TURNEY J., *Frankenstein's Footsteps. Science, Genetics and Popular Culture*. New Haven and London, Yale University Press, 1998.
5. The case of 'Cambridge is exemplary. Harvard University had decided to construct a laboratory for 'medium-risk' experiments on the fourth floor of an old building, the Harvard Biological Laboratories. The project provoked considerable misgivings among scientists at the university, whose authorities were unable to deal with the controversy internally. The issue became public on 8 June 1976 when the local newspaper, the *Boston Phoenix*, published a front-page article with the heading "Biohazard at Harvard". The effect of the article was to shift the debate from the campus to the local community, prompting intervention by the mayor. The latter did not hesitate to dramatise the question, following a well-established script with evoked the mythical Doctor Frankenstein. See TURNEY J., ref. 4.
6. SGARAMELLA V., In Italia si trascura l'ingegneria genetica. *Il Corriere della Sera*, 21.09.1977, p. 17.
7. SIMILI R., PAOLONI G. (a cura di), *Per una storia del Consiglio Nazionale delle Ricerche*. Roma - Bari, Laterza, 2001; PAOLONI G., *Fattori politici e istituzionali che hanno condizionato gli sviluppi della biomedicina nel secondo dopoguerra italiano*. Nuova Civiltà delle Macchine 2001, XIX, 1: 11-28
8. DELLA SETA R., *La difesa dell'ambiente in Italia*. Milano, Franco Angeli, 2000.
9. Significantly, one of the key authors for Italian environmentalism – Jeremy Rifkin and his critique of biotechnology – came to the attention of the Italian public in precisely those years with a book on the energy problem: *Entropy*, published in 1980, was translated into Italian in 1982.
10. DELLA SETA R., ref. 8, p. 39.
11. *Ib.* p. 40.
12. KRIMSKY S., ref. 4.
13. A survey conducted in 2000 showed a substantial lack of difference between replies to questions in which the term 'biotechnology' appeared and those which used 'genetic engineering'. The survey on "Biotechnologies and Public Opinion in Italy" have been conducted by Poster Research Centre under the scientific supervision of Massimiano Bucchi (University di Trento), Federico Neresini and Giuseppe Pellegrini (University of Padova). See BUCCHI M., this issue, pp.
14. T.M., *Cavalier Topo e Madonna Insulina*, L'Espresso, 29 November 1981, pp. 229-31.
15. TERRAGNI F., *Scienza, geni e sregolatezza*. La Nuova Ecologia 1987; 35: 41-44. Interestingly, another article in the same issue of *La Nuova Ecologia* uses 'biotechnology' as synonymous with 'genetic engineering', thereby prefiguring what has become the general usage (FAZIO F., *Biotechnologie ai confini dell'impero*. La Nuova Ecologia 1987; 35: 53-55).
16. TAMINO G., PRATESI F., ref. 2.
17. CERNIA E., DEGEN L., *Le biotechnologie nel settore alimentare*. Roma, La Nuova Italia Scientifica, 1995.
18. TURNEY J., ref. 4, pp. 182-183.
19. The story of Jacques Testart is particularly significant in this regard. His book, published in France in 1986, was translated into Italian in 1988. TESTART J., *L'oeuf transparent*. Paris, Flammarion, 1986.
20. FOUCAULT M., *La volontà de savoir*. Paris, Gallimard, 1976, p. 138.
21. NELKIN D., LINDEE M.S., *The DNA Mystique*. New York, Freeman & Company, New York, 1995, pp. 40-41.
22. LUPTON B., *Food, the Body and the Self*. London, Sage, 1996, p. 1.
23. DOUGLAS M., *Purity and Danger*. Baltimore, Penguin Books, 1970, p. 138.
24. Consequently, it is obviously pointless to engage here in systematic discussion of the innumerable studies conducted on the problem of identity from diverse disciplinary points of view.
25. The quotation is taken from an article by CELLI G., *Venire a patti con la natura*. La nuova ecologia 1987; 39: 56.
26. JACOB F., *On Flies, Mice, and Man*, Cambridge (Mass.), Cambridge University Press, 1997.
27. *Ib.*, pp. 67-68.
28. DURKHEIM E., *Les formes élémentaires de la vie religieuse*. Paris, Alcan, 1912, p. 483.
29. LEVY-STRAUSS C., *Les structures élémentaires de la parenté*. Paris, Presses Universitaires Françaises, 1947; DOUGLAS M., ref. 23. It is in this light than we can interpret the debate which, mainly in the early 1990s, ranged the proponents of the so-called 'complexity paradigm' against those of scientific reductionism. Despite the crudeness of the epistemological definitions propounded by the two sides, the for-

- mer seemingly offered an epistemological basis for the argument of the human uniqueness from which our identity derives, while the latter in many respects represented its refutation. Of particular interest are the articles on the 'complexity paradigm' written by scientists, historians, philosophers and scientific journalists published between January and April 1990 in some of Italy's leading newspapers (*L'Unità*, *La Repubblica* and *il Manifesto*), mostly notably Enrico Bellone, Carlo Bernardini, Marcello Cini, Edgar Morin, Enzo Tiezzi, Gianni Mattioli, Massimo Scalia, Pietro Greco, Marcello Buiatti, Laura Conti.
30. This is the document "Respect for Nascent Human Life and the Dignity of Procreation", published in February 1987 by the Congregation for the Doctrine of the Faith under the direction of Cardinal Ratzinger.
 31. From the article by Alexander Langer "La democrazia biologica" published in *il Manifesto* on 6 May 1987. This strategy of 'cross-alliances' had already been announced by Langer at the first national assembly of the Green Lists held in Florence in December 1984. See DELLA SETA R., ref. 8, p. 51.
 32. See SGARAMELLA V. and ZINDER N.D., *Dolly Confirmation*. Science 1998; 279: 635-636; SGARAMELLA V., *La scienza prima e dopo Dolly*. In: SATOLLI R., TERRAGNI F. (a cura di), *La clonazione e il suo doppio*. Milano, Garzanti, 1998, pp. 53-68.
 33. These, moreover, are arguments similar to those used to distinguish between embryos and pre-embryos in the debate on the status of the embryo before and after Dolly. For details see NERESINI F., *And Man descended from the Sheep. The Public Debate on Cloning in the Italian Press*, Public Understanding of Science 2000; 9: 359-382.
 34. The interview was given by the Florentine anthropologist Brunetto Charelli to the weekly magazine *L'Espresso* in May 1987 (pp. 35-57). A heated debate ensued and continued until mid-June, with echoes in the United States. However, as often happens, the story was a canard, as its perpetrator was later forced to admit.
 35. In February 2001, Severino Antinori and Pavos Zavos announced that "within 12 to 24 months we will be able to clone a human being" (*L'Espresso*, 22 February 2001, p. 42). They repeated the announcement in speeches made at a conference held at the University of Rome the following May, receiving huge media coverage and provoking a storm of protest.
 36. This emerges from the survey on biotechnologies and public opinion conducted by the Eurobarometer in 1999, and from the research study "Biotechnologies and Public Opinion in Italy" conducted in 2001 by Poster Research Centre under the scientific supervision of Massimiano Bucchi (University of Trento), Federico Neresini (University of Padua) and Giuseppe Pellegrini (University of Padua) in collaboration with Gianino Bassetti Foundation for Responsibility in Innovation. A synopsis of the English results and a full report in Italian are available at www.poster.it/biotech.html. See BUCCHI M., *Critical but Striving to be Involved: the Paradoxes of Public Attitudes to Biotechnology in Italy*, this issue.
 37. KRONBERGER N. et al., *The Train Departed without Us: Public Perceptions of Biotechnology in Ten European Countries*. Notizie di Politeia 2001; XVII(63): 13-25.

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CRITICAL BUT STRIVING TO BE INVOLVED:
 THE PARADOXES OF PUBLIC ATTITUDES
 TO BIOTECHNOLOGY IN ITALY

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SUMMARY

Using the results coming from two large surveys conducted in 2000 and 2001 on attitudes and opinion to biotechnologies in Italy, the paper focuses on the relationship between media exposure to science communication, level of information and attitudes to biotechnologies. It is suggested that certain commonplace arguments in this area – eg. that public opposition to certain biotechnologies is only due to ignorance – should be re-considered. A strong demand on the part of the public to be involved in decisions regarding biotechnologies contributes to delineate a rather complex and articulated picture of Italian public opinion and attitudes, which cannot be dismissed as purely antiscientific and hostile.

1. Introduction

During the last years, the emergence of a series of issues with great impact on public opinion – from the repeated Bse alarms, to the debate on Gmos, cloning and embryo research – have pushed the themes of public perception and public awareness of science into the Italian public debate and political agenda. Several scientists and commentators have lamented the presence of a widespread lack of information, attributing the attitudes of public opinion to a misrepresentation of science issues in the mass media and to the insufficient awareness of science on the part of the public¹.

Key words: Biotechnology - Public attitudes - Media Exposure - Public Understanding of Science