

## **Technoscience, democracy and ethical challenges of biotechnology in Brazil**

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### **ABSTRACT**

The increasing questioning of the evolutionist ideas and the great narratives, the classics that served as support to the studies in the field of social sciences, has led to many different reactions within the academic context. Even though the post-modern trends and theories of the end of history have a right to be in this set of possibilities, no less influential are the proposals for revising the reality in which we live from the point of view of the modern project and its radicalization. It is within this project that Anthony Giddens proposes the prospect of a new ontological security pact, which will be built in a world of abstract systems that need to be reinserted in global dimensions. Discussions concerning new biotechnologies, both worldwide and in Brazil, reveal interesting characteristics of this new moment of human history. The access points that result from the fear of famine and environmental concerns, in this case, do more than reduce the reliability of the expert knowledge; they bring about the reorganization of ethical, social and political implications quite distinct from the "heuristic of fear" proposed by the philosopher Hans Jonas. How do such reorganizations point to new trends in the process of technology management in the light of the recent controversy surrounding the new biotechnologies in Brazil? This is the question that this article intends to discuss.

**Keywords:** biotechnology, biosafety, social risk construction, environmental ethics, democracy

In recent decades, the visibility achieved by the controversies and debates about genetic engineering techniques has caused some discomfort, to say the least, among those social agents who tend to defend technoscience<sup>1</sup> as a positive sign – immanent to the progress of mankind – that would, by itself, provide solutions to the diversity of problems faced by modern social groups. The rhetoric of technoscience as a “panacea” that would solve the problems of hunger, malnutrition, disease and environmental degradation is no longer allowed free passage on the unlimited linear surface of a science founded in the Enlightenment, running into a new epistemology of knowledge, which, in the Popperian sense, is built on quicksand and it is also based on not-knowing (Silveira, 2005).

As a result of the recent developments of the technoscientific knowledge, as well as the increasing negative impact of human activity through the use of technical devices, the current questioning of the certainties of the Enlightenment paradigm promotes an institutional renewal of modernity: at the same time that scientists are asked to opine as expert systems<sup>2</sup>, from a state of uncertainty in which the authoritarianism of truth is no longer possible, and the “secret of the prince,” embedded in the modern processes of recognition of the technological and scientific authority, is undermined by the inclusion of the concept of risk in the democratic game; on the other hand, the national States feel increasingly encouraged to articulate their internal decisions with standards and protocols of international legitimacy, and, relying on the objectivity of reason, they seek to redefine the social values in order to break the division between nature and culture, between technoscience and democracy.

Science, combined with an ethic of prudence, is the philosopher’s stone of this institutional renewal. In the particular case of the implementation of genetic engineering techniques, the renewal would be reflected in the national policies of biosafety, which combine the common language of technoscience with the common value of biodiversity (biological and cultural) to provide a new social contract, based on an environmental ethics. Ethics that, contrary to the apology of inaction, attempts some kind of orchestration of interests, situated between the ideals of the technoscientific objectivity and the techno-political subjectivity. But, does the current direction of the biosafety policies, especially in Brazil, precipitate the break in the division between social groups and nature, between technoscience and democracy? Is it possible that the Brazilian context of the management of modern biotechnologies, or rather agricultural biotechnologies, point to an institutional renewal in these terms? These are some of the questions that this article intends to explore, albeit it does not intend to be conclusive.

### **The counterpart of modernity: technonature and its dark side**

The rupture, found in modern thought, between social groups (culture) and nature, between technoscience and democracy, is symptomatic of the words of Pascal, who, believing himself to have been cast out of nature, says: “*The eternal silence of these infinite spaces fills me with dread.*” In this sense, it is clear that the alliance between modernity and Christianity was emphatic in its narrative of the creation: it sees man in the image and likeness of God, separating him from nature and allowing him to make use of it with free will, in accordance with his needs.

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<sup>1</sup> Technoscience is a system in which scientific and technological knowledge are strongly associated, working globally through constant innovation in the production and dissemination of technological artifacts into new markets and the intensive financial support. According to Latour (1994), it is not possible to think of science and technology separately.

<sup>2</sup> Borrowed from Giddens (p.35, 1991), the concept used here refers to “systems of technical accomplishment or professional expertise that organize[s] large areas of the material and social environments in which we live today.”

Although this narrative makes use of the Platonic representation of the demiurge as a god that is not all-powerful and does not have the power to create a world from nothing, being limited to shape the matter, to organize it from pre-existing chaos; the Christian thought reverses Plato's: if the demiurge, as an artisan (demiourgos), did not do what he wanted to do, at least he got the best possible results; the Christian God, on the other hand, is all-powerful, He creates the world as He wants it to be, from nothing, and not from chaos to order. Thus, since the Christian man is made in the image of This God, he has the ability to take His place. As he recognizes himself as an antinatural being, because he is separated from nature, the human being believes that domination is his only way to be reintegrated with it (nature), to avoid being terrified by the silence inflicted on him by heaven.

But if it was necessary seventeen hundred years for this ethical principle of modernity, born with Christianity, to finally find the concept of nature that best suits it – that of a nature stripped of all mystery and enchantment, that of a fabricated, artificial nature, which is available to use and it is possible to manipulate – ideal for the application of classical physics to a world that claims for unification through the law of universal attraction – the world of the Newtonian synthesis – but it will not withstand the relentless increase in the number of exceeding cases. The universe, and the living beings in particular, proved to be too disobedient to fit into the regularities of the universal laws, and every discovery in the fields of zoology and botany is impressive to the system, as a proof of the presence of God in the detail, in the diversity (Larrère & Larrère, 1997).

However, as difficult as it was to generalize such a model, the emphasis on the scientific community, as well as the practice of experimentation and the establishment of judicial proof, bear more resemblance to the monarchies than the deliberative democracy of the Greek polis. The model was turned into a paradigm, in the Kuhnian sense, providing an example to the positive aspects that emerged later.

According to Giddens (1991), it is due to the influence of this contemporary understanding of modernity that the social scientists do not understand it properly. Therefore, he maintains that the cultural and epistemological orientations of the current sociological positions are misleading, because they observe the present time from a preceding or a later state of affairs, and they will defend, respectively, the emergence of a new social system (“consumer society,” “information society,” etc), and the end of another (“postmodernity,” “postmodernism,” “post-industrial society”), thus avoiding the study of the fact itself, which is the radicalization of modernity and its consequences. Regarding the recurrent epistemological approaches, Giddens mentions Lyotard – who spread the concept of postmodernity and, more important, promoted the disarticulation of attempts to support the epistemology and the faith in humanely planned progress – and questions him on the fact that the legitimation of heterogeneous claims to knowledge, with no privileges to science, makes it impossible to aim at a systematic knowledge of the current period. For if it were valid, such a proposal would affect the practice of the social scientists, since any effort to apprehend the current period would be useless and, consequently, it would be disregarded in favor of a healthy physical exercise.

But if the sociologists' effort to understand the modernity is spoiled and contaminated by such interpretations of contemporary reality, Giddens condemns the loss to the Social Sciences, which is due to the influence of evolutionary ideas, here understood as “*history [that] can be told in terms of a 'story line' which imposes an orderly picture upon the jumble of human happenings*” (p.15, 1991); since they promote only the “opportunity side” of modernity, and leave in the shadows its dark side. In this sense, the author states that

*The development of modern social institutions has created vastly greater opportunities for human beings to enjoy a secure and rewarding existence than in any type of pre-modern system. But modernity also has a somber side that has become very important in the present [20th] century [...]*  
(p.16, 1991)

However, the truth is that, even though they produced their works in a turbulent period of history, the classic authors, especially Marx and Durkheim, appreciated the ‘opportunity side’ of modernity, foreshadowing the emergence of harmony and social control. Marx emphasized the consequences of class struggle; Durkheim invested in the organic solidarity that results from the division of labour, and social integration with the preservation of individual autonomy. Even Weber, who was the most skeptical of the three authors, realized that the excessive use of rationality and bureaucracy would crush human creativity and individuality, but he could not anticipate the dark side of modernity. Thus, although the three authors saw the degrading consequences of the modern industrial work, which subjects human beings to an exhaustive, repetitive work discipline, none foresaw that the development of the “productive forces” would have a large scale destructive potential in relation to the natural environment.

It is within this context that Giddens will propose a different analysis of modernity, which would overcome the sociologists’ current problems in the assessment of the environmental concerns (in its dark side, alien to modernity, as it was conceived by the Enlightenment), assuming that

*The world in which we live today is a fraught and dangerous one. This has served to do more than simply blunt or force us to qualify the assumption that the emergence of modernity would lead to the formation of a happier and more secure social order. Loss of a belief in “progress,” of course, is one of the factors that underlies the dissolution of “narratives” of history. Yet there is much more at stake here than the conclusion that history “goes nowhere.” We have to develop an institutional analysis of the double-edged character of modernity (p.19, 1991).*

For the author, the division between modernity and postmodernity proposed by Nietzsche served to reveal the hidden assumptions of the Enlightenment, without excluding us from modernity. And it is in this sense that Giddens says it is better to speak of “modernity coming to understand itself,” because the dogma of providential progress, which replaced the divine providence, has finally released reason from the certainties of the Enlightenment. Thus, from now on, no more knowledge can be built on unquestionable foundations, and even the most consistent concepts may be seen as valid “in principle” or “until further consideration.”

In other words, the epistemological foundations that supported the claims of control, allowing the humans, in their externality, to take possession of nature, to dominate it, to subdue it, and reinvent it in accordance with their wishes, have crumbled<sup>3</sup>. Thus implodes the thesis of the end of nature that has been serving both to the apology of artificiality, and the eulogy of nature; it relied on the belief, common to lawyers and prosecutors, that modernity has destroyed nature. But it is from this implosion that comes the inflection of the modern paradigm, because the artificiality of nature corresponds, proportionally, to the naturalization of the devices that are beyond our control. Therefore, there is no technosphere anymore, but a technonature that includes our works<sup>4</sup>. Works such as those that we have created through natural processes, and eventually abandoned us; works whose natural future escapes from our hands. In this sense, it is possible to say that nature still

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<sup>3</sup> It is also possible to find in Bruno Latour (1994, 2004) the idea of an ontological and epistemological division between society (social groups) and nature through the reconfiguration of the ontological and historical understanding of the way through which the Companies have built their Constitutions from the presence of several non-humans in alliance with humans and hybrids of culture and nature, whose result is the collectivity in which we live. The Latourian notion of social groups takes into account the participation, in the same space, of humans and non-humans, symmetrically organized.

<sup>4</sup> The terms technosphere and technonature are used here to designate: first, the idea of nature as completely controlled and manipulated by man; and second, an idea of nature that responds to human action, but not in accordance with our wishes, producing unpredictable results.

exists, and the problem is not its annihilation, but the fact that we have acted as if it did not exist, that we have acted as if only the machines existed and as if we were separated from that universe.

### **An institutional reading: expert systems and deliberation among equals**

Therefore, following this line of argumentation, the advances in knowledge that have occurred since the Enlightenment revolution have revealed an idea of nature that transcends and encompasses the humans, that has no need for them to continue its history. And this assertion reveals a limitation in the maintenance of the ethical model of modernity: anthropocentrism, in which humans are separated from nature, in a position of experimentation and control. But, on the other hand, it is due to these findings that man can not return to the ethical model of Antiquity, which put the humans, microcosm within the macrocosm, in the center, in a position to observe nature. The current state of knowledge has implications that contribute to a rejection of the arguments that favor humans in their relationship with nature (because the anthropocentrism has crumbled, literally, to the ground, due to the distortion of the geocentric theory); and also to ensure that current developments in search of an ethics are guided by a scientifically informed view. An environmental ethics would consider only the traveling companions, from other species, in this odyssey of evolution. The humans, reintegrated with nature, would no longer enjoy a privileged position.

However, the evidence does not allow us to forget that the construction of a scientifically informed view of nature, to break with the already established division between social groups and nature, between technoscience and politics, will not happen without resistance from the scientific *habitus*<sup>5</sup>, because

*there is no need to adopt Kuhn's social epistemology to find out that the most significant gaps in science are precisely, and usually, those that are controversial. To role of a nature's spokesman, as an expert or part of a public debate, may be reduced to the dissemination of what is consensually accepted knowledge. It means informing citizens and decision makers about common truths. Similar beliefs are in serious danger of becoming the vehicle to an outdated state of knowledge, which, in anticipation, would be counterproductive (Larrère & Larrère, p.257, 1997)\*.*

The recognition of the scientific uncertainty (and controversy), and the subsequent social construction of the dark side of modernity, i.e. the awareness of the risks that result from human action on nature, trigger a rejection of the Platonic model of the authoritarianism of truth, good or beauty, over the human community, and force nature and technoscience into the social groups, to become a subject of public debate. And if, by following this course, we leave behind the perfect and unchanging world proposed by Plato, a world we could take appropriate through the application of objective scientific knowledge and mathematics, the fact is that we tend to move towards an Aristotelian model of prudence; since, *"in a world of uncertainty, when one is confronted with different and unresolved scenarios, it is not reasonable to be limited by rationality. An ethic of prudence is likely to avoid decisions whose effects may have harmful consequences."* (Larrère & Larrère, p.194, 1997)

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<sup>5</sup> In the Bourdieusian sense, the notion of *habitus* indicates *"a unifying and generative principle: it translates the intrinsic and relational qualities of observable externalities into coherent schemas."* (Bourdieu, p.21-22, 1996).

\* Translator's note: all quotations from here on are freely translation from Portuguese.

In other words, the environmental crisis, here understood as a context that, in the last decades, encompasses scandals such as the Bovine spongiform encephalopathy (BSE), commonly known as mad-cow disease (MCD), the dioxin-contaminated chickens, the problems involving pesticide residues, and the risks involved in the use of nuclear power, the whole “biotechnology issue;” it is a call to action for nature’s spokespersons and, despite the fact that society, the decision makers and the public opinion expect simple answers, it is necessary to understand that those will be able to answer questions on the threat of prion<sup>6</sup>, the possibility of another Chernobyl, the impact of the contamination by pesticides, and the genetically modified organisms (GMO), only if they expose their doubts, if they demonstrate the insufficiency of the available data, as well as the divergences that exist within the scientific community.

More than ever, to present such issues as depending solely on the technical application is a way of avoiding a discussion of multiple objectives that would offer a possibility of choice in which many would have us to believe that there is a necessary correlation between them. In relation to the discussions involving agricultural biotechnologies, for example, there is a visible effort from one side of the debate to prevent public participation and discussion. The “agents of technological optimism,<sup>7</sup>” heirs to the Enlightenment, argue that only the molecular biologists are able to decide and provide an opinion on the safety of genetically modified organisms, especially the seeds of transgenic soybean resistant to the *Roundup* herbicide. In defense of the “theory of genetic determinism,” they overemphasize the “scientific fact” to the detriment of other “social values,” and as a result, even though they simulate a democratic debate, their intention is to silence it in favor of an overvalued molecular biology, in spite of the other scientific disciplines and the political and social interests. Powered by a view of techno-scientific innovation as “evolution” and “progress” of knowledge, in its linear and cumulative process as a device endowed with an undeniable reparative potential, able to fix, by itself, the impacts resulting from the use of previous technology, or to provide solutions for social problems recognized by the world of common sense.

However, where the “agents of technological optimism” see “progress,” the “caution critics” see the “social and environmental impacts” of the techno-scientific innovation, and present it within a context of “unpredictability” and “uncontrollability.” For them, it is as if the genes had the alternative to combine in some other way, different from what the universal thought considers to be normal, as if the DNA puzzle had not been solved once and for all, as if nature could react to its artificialization through the naturalization of works that escape from our alleged control. The theory of gene flow<sup>8</sup> evokes this idea of a contingent nature that has evolved concomitantly with human action.

Such positions, listed in Table 01 below, have polarized the public debate in the state of *Rio Grande do Sul* and Brazil, and the study of these two different conceptions of nature will provide contrasting political strategies to deal with the question. First, there are those who believe in a technosphere controlled by human reason and defend the autonomy of technoscience in the face of a policy to comprehend the objectivity of the universe, maintaining the division between social groups and nature, between technoscience and politics. On the other side, there are those who, realizing the *unpremeditated consequences* (Giddens, 1991) engendered by our technological devices, believe that the only possible way to resolve the dispute is to build a debate as broad, as informed and as rigorous as possible. From this point of view, it is not as if the opinion of the expert would have the same weight as that of other social values and judgments, on the contrary, it is

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<sup>6</sup> A protein identified as the cause of the Bovine spongiform encephalopathy.

<sup>7</sup> This designation, like that of “caution critics,” has been used by the authors to refer to the parts involved in disputes over agricultural biotechnologies in Brazil, and more particularly in *Rio Grande do Sul*, in order to characterize the different positions taken in the dispute (Silveira, 2005 Silveira & Almeida, 2005a; Silveira & Almeida, 2000b).

<sup>8</sup> The idea of gene flow is defended by the “caution critics,” who took positions that diverge from those engendered by their opponents (the idea of genetic determinism). The gene flow presents risks, uncertainties and ambiguities, and it has become a weapon in the struggle to produce a counterpoint.

privileged due to its teaching objectivity; but to expose it to the public for discussion, not only its certainties and assumptions, but also the controversies and uncertainties, thus resuming the teachings of ancient Greece in relation to the close interdependence between science and democracy.

<b>Agents of technological optimism</b>	<b>Caution critics</b>
TECHNOSPHERE	TECHNONATURE
(object)	(subject)
Progress	Social and environmental impacts
Genetic determinism	Gene flow
Well-known and controllable technology	Unpredictable and uncontrollable technology
Release	Precautionary Principle
Scientific fact	Social value
Overvaluation of molecular biology	Deliberation among equals, symmetry

Table 01 – “agents of technological optimism” and “caution critics”: representations of nature, techno-scientific innovation and its impact in the public debate, within the context of the disputes around the seeds of genetically modified soybean in the state of *Rio Grande do Sul* and in Brazil (Silveira, 2005; Silveira & Almeida, 2005a).

Thus, there is a discourse that defends the indiscriminate release of genetically modified organisms into the environment, heralded by the “agents of technological optimism;” and there is an idea of social risk that, inheriting the Greek virtue of temperance and moderation, pays attention to the uniqueness of each case and adopts precaution as a rule. Unlike the conception of a monarchical science, legitimized by modernity and antagonized by the authoritarianism of truth, which intends to put an end to the public debate by classifying as “irrational fears,” “emotionalism,” “terrorism” and “obscurantism” the critical view of the agricultural biotechnological innovations; the praise of prudence is evident in the discourse of the critics.

From an ethical point of view, it means that the critics defend that “*there is an obligation to know what seems to be a recognition of our ignorance: we do not have scientific knowledge of the*

*future consequences of our actions*” (Larrère & Larrère, p.272, 1997). But this point of view is also pro-active. The “caution critics” do not recommend inaction in the face of the risks associated to human action, but argue for ethical practices to work along with the technoscience: the precautionary principle and a set of rules and policies created in the last decades to prevent and manage the dark side of human action may find application in the political space of democracy. But even if these actors take into account the uncertainties of the scientific knowledge, they do not intend to reject it. The reason removes the fear, which can only be conceived within the ethics of rupture, the division between politics and technoscience, between nature and social groups. When (*a la* Giddens) the reason, as well as the religion, is detraditionalized, released from the dogma, when the process of knowledge production incorporates the reflexivity, then the Lights switch place. The technoscience that dictated directions for politics is replaced by a deliberative action among equals, guided by expert knowledge. From Antiquity, it retains the practices of good use and prudence; from modernity, the need to have knowledge in order to act. The result is the good use of the environmentalism, based on knowledge that is well aware of its limits.

### **A democracy beyond the authoritarianism of scientific truth and sociocentrism?**

When the German philosopher Hans Jonas founds the “heuristics of fear,” in 1979, that is, when he argues that we should invest in the control of a technical device that is proportional to our power to intervene in nature, he is recognizing the dark side of modernity. But he maintains the division between society and nature. He denounces the technical utopia to preserve the illusion of total power. Seeking to replace technoscience with ethics (Jonas, 1994), he maintains their separation. Crediting the authoritarian regimes with the ability to deal with environmental problems, he goes as far as to propose a model that, considering the worst possible scenario, provides an apology for inaction. The fear, associated with “irrationalism” and “emotionalism,” is a direct criticism of the “evolutionist” and “progressive” ideas of modernity.

However, the use of fear to influence behavior is not very effective. It is like the smoker who, threatened with cancer, pulls a cigarette to ward off the fear, for example. According to Larrère & Larrère (1997), Jonas left out of his “heuristic” the field of rational argument, the political model of prudence, deliberation, within which the precautionary principle seeks for its content and for which “*the idea that men are responsible for the ills that affect them compels some to look for a cure.*”

*Such is the model of the social risk construction. To isolate it, to see what it implies, how it works, is to appreciate its qualities. It is possible to combine two competences, which have proved their worth: the technical expertise to fix our relationship with nature, and the political skills to solve human problems (Larrère & Larrère, p.234, 1997).*

In this sense, it is about entrusting the biotechnological management to a political mediation: notwithstanding the uncertainties of reason (not the irrationalism), after a debate as informed as possible, owing to the technoscience, it will have to resolve the irresolvable, it will have to answer the questions to which the current state of technoscience can only offer doubts, contradictions and dissent. But it is necessary to avoid the point of view of the “agents of technological optimism,” according to which “*just admitting doubts about GMs automatically identifies the individual as a warrior of the dark side, someone who prevents scientists from eliminating humankind’s greatest burden, famine*” (Leite, p. 1, 2004-a).

Whereas at one time science intended to replace tradition, in its transition from cosmogony to cosmology, and then the positivities; the fact is that it needed, until recently, to break away from from tradition, to deny its role as an unquestionable dogma. The advances in knowledge, provided



by modernity, and the impacts of technonature allow, at last, the questioning of the scientific fundamentalism (Giddens, 1991; Silveira & Almeida, 2005b; Silveira & Almeida, 2000a); the reason must explain itself within a deliberative and democratic space. But then, the social responsibility of the scientist is not that of presenting to the public black boxes labeled by topics, not anymore, but “*to exercise against all odds the teaching of objectification*” (Roqueplo, 1993 *apud* Larrère & Larrère, 1997). Such teaching will be valid only if it incorporates the reflexivity, which, since expertise has been established as an unquestionable substitute for tradition, “*consists in the fact that social practices are constantly examined and reformed in the light of coming information about these very practices, thus constantly altering their character*” (Giddens, p. 45, 1996).

The detraditionalization and the inscription of reflexivity in the basis of the system are challenges that, from the introduction of modernity down to its current radicalization, have instigated reason in its come into being. But the triggering phenomena of the institutional change that we are also experiencing, as indicated by Giddens, would be complemented by the symptomatic globalization of the social practices, which would bring new implications for the scientific *habitus*. A pragmatic example, related to the recent discussions on biotechnology and biosafety, was the precedent-setting exercise of biodiversity as a “global goal.” According to Larrère & Larrère (1997), it was the result of a successful articulation of a large number of researchers around the world, from various specialties, and their commitment led to a global alliance for the defense of the world heritage: the Earth Summit of 1992 and its Convention on Biological Diversity, a confluence of scientific, economic, political, social, and moral interests, among others, on this issue of global impact. Exercising their teaching of objectivity, the scientists have stressed the challenges of defending biodiversity, they exposed to the public their doubts, hypotheses and controversies on the subject (climate change, species extinction, greenhouse effect, etc.), to provide possible scenarios to alert the global community.

However, as Latour would say (*apud* Leite, 2004b), this redefinition of the role of the scientist is not without concerns, and the proof is the representation of science and technology, exploited by the “agents of technological optimism,” on the issues of biosafety, which confirm the competence of the molecular biologists. The agents proposed that the *Comissão Técnica Nacional de Biosegurança* – CTNBio (National Technical Biosafety Committee) should be composed exclusively of molecular biologists, in a project sanctioned in 2005 (Brazil, 2005). This is a *sui generis* repetition of the Asilomar Conference (1975), but on global dimensions, since it was expanded to the developing countries that had been left out of the international discussions on technological innovation in 1975.

It is worth to mention that, in 1975, “*after the scientists expressed serious concerns with the announcement of the success in transferring genes from one species to another*” (Kempf, p.49, 2004), a conference was organized by the National Academy of Science, in Asilomar – the name by which it became known – but the event was virtually behind closed doors, an elite gathering of 140 researchers who spent four days discussing the future of the researches on genetic-engineering technologies. The debate was centered on the safety aspects of the experiences, the rules that would be necessary for them to continue without threatening the freedom of the scientists. As stated by Kempf (p.48-49, 2004), the biologists intend to limit to a minimum the interference of the public or the government in their business (Kempf, p.48, 2004), and in the end, the meeting achieved the goal of most molecular biologists: to ensure, without outside interference, the control of the procedures and the exclusion of the social from the definition of the problem (*ibid.*, p.49).

But, according to some, that attitude of the scientists is no longer possible, since it would be a “shot in the foot” to defend the authoritarianism of scientific truth in controversial issues such as the biosafety aspects of the new biotechnologies. The recognition of different skills, and not only the scientific skills, must be taken into consideration; in the Brazilian case, the result was the creation of the *Conselho Nacional de Biosegurança* – CNBS (National Biosafety Council), although the division of tasks between the CTNBio and the CNBS is not clearly defined, and the

permanence of the molecular biologists' "superpowers" (Silveira, 2005; Silveira & Almeida, 2005a; Silveira & Almeida, 2005b), which are incompatible with the institutional renewal proposed by the previous scientific advances and regulations, around the democratic and preservationist principles (the Precautionary Principle, the Convention on Biological Diversity, the Brazilian Consumer Protection Code and the Brazilian Constitution, the National Environmental Policy, among others).

As stated by Latour (*apud* Leite, 2004b), considering the fact that "*it is necessary to think about gene flow, about laws, about this and that, about the number of elements that will go to the meeting, who must be recruited and accepted without being belittled,*" the discussion should have, at least, two functions. The first of which would be to consider the diversity of interests and entities involved. The second would be to decide *how to organize, or combine, these different institutes, within a common world*. It is like building a house, for example, where there are carpenters, plumbers, etc.; they would not be building many different houses, instead, they would be working in the same house, in the same common "cosmos," to use the old Greek expression. In the case of the genetically modified organisms (GMOs), that cosmos involves international politics, subsidies, legal aspects, the ecology of gene dispersal, the question of where to find public and convincing experiments, and so on. Thus, in these terms, the molecular biologists, who support the tradition of the authoritarianism of scientific truth, are wrong, because it is as if they do not want their technoscience to succeed.

Nonetheless, a public debate is really necessary, and the institutional forms of knowledge should avoid the imposition of a single thought and solution to favor a government, a large body of State or a scientific community in particular. And in this sense, neither the Platonic dictatorship, nor the authoritarianism of scientific truth, which is the same thing, poses a real threat to this new institutional contract between democracy and technoscience, between nature and social groups. If it is possible to recognize a reason based on uncertainty and reflexivity, then it has become a "soft science," which does not bother to expose its contradictions in the public space, but there is still the risk that politicians may feel forced to take "hard decisions." The need for definitive answers and strategies from the part of the governments and States, in the face of foreign and domestic policy, creates a new impasse in the form of blackmail. In addition, this process to legitimize environmental and biosafety issues suffers the interference of economic, political and social strategies, with no immediate relation to the object of concern. There is also the risk of not addressing the threat, being concerned only with its economic, political or social goals (Larrère & Larrère, 1997).

## Conclusion

To combine technoscience and democracy implies a balanced division of tasks. Technoscience is already prepared *to think like a mountain*, according to the (environmentalistic) *Land Ethic* of Aldo Leopold, a forester who learned and taught that to respect and protect nature, it is necessary to think of ourselves as the being (the land) that we want to conserve as it is (Larrère & Larrère, 1997). But to embrace conservation, it is necessary to abandon the polarity of the "subject-object" relationship (Table 01). Nature is a landscape whose construction or destruction has man as a co-producer (or co-destroyer), without forgetting the exercise of reason. But not the reason provided by the scientific authoritarianism, advocated by the "agents of technological optimism" and manipulated by political (blackmail) or economic (the pursuit of profit) interests. To try to act as each element of nature, to try to think like a mountain implies the appraisal of the biodiversity, as well as the social diversity. And no one is more able to act positively in relation to the biological diversity than the natives, who, equipped with a look of participants, are the ones who know better the environment they want to conserve.

In this sense, it is possible to say that, "*global progress is devastating: it homogenizes, normalizes, undermines the genetic diversity and the specific diversity, the functional diversity and*

*the spatial heterogeneity, in summary, it undermines the biodiversity”* (Larrère & Larrère, p.323, 1997), just like the knowledge, that, pretending to be universal, destroys that which is most valuable: the casual, the chance, the unexpected, the surprise, the different, the diverse.

The expression “think global, act local” is more valid than ever. Technoscience, extended throughout the world in the form of networks by expert systems, has, in this new contract, the responsibility of assisting the social groups in the construction of citizenship through the validation of the local knowledge. But if it is possible to think of some form of progressive universalization through the extension of local experiences regulated by a consensual common goal, i.e., if it is possible to think within this logic that is the conservation of a biodiversity closely related to the cultural diversity, then we can no longer neglect the issue of power, domination, and the old democratic debate on opportunities for minorities, because, according to Touraine,

*it is necessary to cease to oppose, rhetorically, the power of the majority to the rights of the minority. There is no democracy if these two elements are not respected. Democracy is the regime in which the majority recognizes the rights of the minorities because it accepts that today’s majority may become tomorrow’s minority and be subject to a law that will not represent its interests, but that same law will not deny the exercise of its fundamental rights* (p.29, 1996).

Only a technoscience that validates knowledge and only a social group that respects minorities would be institutionally prepared to deal with a new development project intended to be durable and sustainable, as well as the issues of biosafety. It is not about importing innovations from developed countries, as in the case of GMOs, whose patents revert to the United States, but are increasingly spread across the globe. It is about deciding what are our real problems and social challenges, to develop appropriate technologies to deal with them and benefit from it. While the unequal relations continue to allow the megadiverse countries to have their resources plundered and patented by developed countries, everything will be taken from us, even the capacity for knowledge production. We have need of a technoscience that produces taxonomists who want something more than simply serve the multinational interests to charge royalties. We need to know objectively our diversity, but we also need, as a precondition, to respect our social diversity. Both go hand in hand.

Thus, even though the sustainable development and the biodiversity are planetary goals, they are implemented through local experiences, making use of territorial resources, social settings, political situations, and possibilities for the application, within this context, of available technologies. If the current scenario of the discussions on the agricultural biotechnologies and the issue of biosafety in Brazil reveal a strengthening of the position of the “agents of technological optimism,” a manipulation of technoscience through the legitimation of the authoritarianism of scientific truth (as reflected in the “superpowers” of the CTNBio) to cover sociocentric interests that involve royalties, international politics and relations of dependency, all of it to maintain modern anthropocentrism; this position, fortunately, is not the only one there is. Behind the diffuse initiatives of the “caution critics,” there are many visible signs that the history of the tense relationship between technoscience and democracy can no longer be silenced. If the monarchy served it well, the incorporation of democratic dispositions and the advances in knowledge and the environmental problems are beginning to draw the contours of its shroud. And a new ethics, born from this state of facts, would invalidate the expression “everyone for himself.” They are all drifting along, in the same boat, in search of the north: nature and social groups, technoscience and democracy.

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