

BIOTECHNOLOGY IN GREECE

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1. Introduction

In Greece, the debate over issues emanating from biotechnology applications has been following rather than leading its counterparts in other European countries. Marouda-Chatjoulis *et al.* (1998) point out that unlike other European Countries there was no Greek policy activity regarding biotechnology in the 1970s in reaction to the US debate following Asilomar. Moreover, there was no Greek firm or industry involved in biotechnology applications during the 1970s. The Greek state entered the biotechnology debate only in the early 1980s (Marouda-Chatjoulis *et al.*, 1998; Caloghirou & Zambarloukos, 2000). Additionally, the debate occurred almost entirely inside informal fora such as scientific meetings and conferences, in which the Greek public was just a

distant entity that was largely uninformed of biotechnology until the mid 1990s, as the Eurobarometer indicates. From this point of view, Marouda-Chatjoulis *et al.* (1998) identified the key constituencies mainly being scientific organizations, such as the Greek Association of Chemists, the Greek Association of Biologists, the Greek Biotechnology Society, the National Hellenic Research Foundation, etc. These organizations have traditionally adopted a 'pro-technology' stance (Marouda-Chatjoulis *et al.*, 1998). It was only after the mid 1990s, with the advent of the GMOs controversy, that the debate included more active protest mobilisations, originating from NGOs like Greenpeace. During the same period, public anxiety dramatically increased. Two were the more prominent issues in public discussions: GM food production and cloning.

Generally, we could classify research and development policy as well as the debate on biotechnology into two distinct chronological periods: 1982-1989 and 1989 to the present. The first period is characterised by the lack of public awareness on biotechnology and the weak efforts of the state to support scientists in their research and to capitalise on biotechnological breakthroughs. The second period, especially in the 1990s, is marked by the negative public attitude towards biotechnology and its potential risks, as well as the emergence of the debates over GM food, cloning and more recently over the DNA decoding.

2. The Period 1982-1989

Key decisions and outcomes

During this period, the government for the first time attempted to develop a national policy for biotechnology. In the early 1980s, the General Secretariat for Research and Technology (GSRT) (at that time Ministry of Science and Technology) announced that biotechnology was one of the three priority policy areas and needed to be funded. Certain policy initiatives were undertaken, which were only partially successful. The government made efforts in building the infrastructure that would enable biotechnology research to be carried out. This research took place mainly in (state) universities and public research institutes (Caloghirou & Zambarloukos, 2000). Several regulations and laws were established in order to facilitate the alignment of Greece with the European Community. Among others, Marouda-Chatjoulis *et al.* (1998) report a non-statutory regulation on gene therapy, which had passed in 1984-1985. However, there was no explicit biotechnology programme during this period.

One of the most important actions taken in this period was the creation of the Institute of Molecular Biology and Biotechnology (IMBB) in Crete in 1983. Since 1987, IMBB is one of the seven institutes of the Foundation of Research and Technology (FORTH) and has close ties with the University of Crete. Its research, in the areas of insect molecular biology and in molecular biology of unicellular organisms, has received a high degree of international reputation.

Inclusion and exclusion of public/civic participants

Public influence on biotechnology policy-making was minimal in the 1980s. Citizens were largely uninformed of the various issues related to biotechnology. The government had not made any serious effort to raise public awareness. This could be in part attributed to the fact that Greek firms were not yet gravely involved in biotechnology. Scientists appeared to be the only actors included in consultation and decision-making. There is no information indicating an active role in that period by NGOs or other *public/civic participants*, at least not to our knowledge.

Setting the agenda

It is apparent from the aforementioned illustration of the policy-making spirit of this era that the main, if not the only, actor on the policy level was the Greek state. In the 1980s, the dominant political party, which ruled from 1981 until 1989, was the Panhellenic Socialistic Movement (Pa.So.K). Its governmental program had placed emphasis on the role of the state and its policy at that time favoured research only inside universities. Note that all Greek universities are state institutions until now. Moreover, the bad economic environment might have been a factor explaining the lack both of biotechnology innovations in Greece and public awareness on relative issues.

It might be reasonable to assume that the *main input to the policy process* was coming only from the side of the scientific community, inside of which controversies regarding values and risks of biotechnology were debated. The state responding to the scientists' demand for a 'common body of action' on uses and applications of biotechnology established Biohellas SA in 1984 with investments from GSRT, the Agricultural Bank of Greece and the Greek Bank for Industrial Development (ETBA). Biohellas SA was the formal state policy body in biotechnology aiming to promote and develop biotechnology research in Greece. Biohellas SA was meant to be an intermediary between the private industry sector and the state funded universities and research centres. Unfortunately, the outcome was not as anticipated and finally Biohellas SA was closed down in the early 1990s. Shortly after the establishment of Biohellas SA in 1983, EL.KE.PA (the Greek Productivity Centre) and the University of Crete initiated a collaboration to offer training in biotechnology as well as to conduct applied research especially in the field of agricultural biotechnology and environmental protection. At last, in 1983-1984, five Biotech related conferences were organised, two by the government and three by scientific organisations (Marouda-Chatjoulis *et al.*, 1998).

The end of this phase offered some evidence of an institutional upgrading with respect to the increasing applicability of biotechnology. The Centre for Training and Development of the Agricultural Bank of Greece, participating in the EU project COMETT, developed an educational and training programme in English on agricultural biotechnology and organised a number of training seminars. Moreover, GSRT established postgraduate studies in the field of biotechnology. Furthermore, the Hellenic Association of Biotechnologies was founded in 1988 (Caloghirou & Zambarloukos, 2000).

Media Coverage

Drawing on the survey conducted by Marouda-Chatjoulis *et al.* (1998), we could describe the range of media coverage of biotechnology during this first period. Generally, media coverage of biotechnology in Greece was and still is minimal compared with its counterpart in other EU countries. In fact, it is by far the lowest among all European countries. The first newspaper articles regarding biotechnology have started appearing in 1977, according to the aforementioned survey. Until 1985, most articles were reporting the general progress frame, while a small proportion was mentioning some concerns about the risks of opening ‘Pandora’s box’. The media were portraying an image of biotechnology-related events as occurring far from Greece, providing some feeling of security (Marouda-Chatjoulis *et al.*, 1998). The remaining three years of this period (1986-1989) were characterised by a relative silence regarding media coverage of biotechnology in Greece.

3. From 1989 to the Present

Key decisions and outcomes

Since 1989, R&D policies are financed by EU structural funds and guided by EU framework programmes. National strategies are subsumed under EC policy directives and emphasis is placed on the absorption of EU structural funds and participation in EU framework programmes as a means to enhance university-industry collaboration and activity in areas of high technology. Over the period 1989-1999, three structural programmes targeting science and technology in Greece were implemented, all of which were mainly financed by EU structural funds. Details about these programmes are presented later.

The first two years of this period are different regarding biotechnology activities and debates in relation to the following years. Neither scientific conference took place nor there is evidence of any national policy activities or debates. It seems that biotechnology was allowed to evolve without new regulations and, furthermore, the corresponding media coverage was minimal until 1992 (Marouda-Chatjoulis *et al.*, 1998).

The years 1992 to 1997 are characterised by the fact that the Greek state and public were confronting the reality of biotechnology in agriculture. In 1993, the Ministry of Agriculture established the Organisation for the Control and Certification of Biological Products (Marouda-Chatjoulis *et al.*, 1998). The goal of this organisation was to promote biological agriculture as well as to provide the means of controlling and certifying relative products.

In order to align the Greek legislature with EU directives, various non-statutory regulations were adopted concerning genetic screening (1992), novel foods (1992), the use of GMOs (1995) and their deliberate release in the environment (1995) (Marouda-Chatjoulis *et al.*, 1998). In particular, the EU directive 90/220 concerning the purposive

release of GM organisms in the environment was incorporated in 1995 into the Greek legislation. Until then, there was no framework governing the use and release of GM organisms. Similarly, the EU directive 90/219 regarding the limited use of GM microorganisms was incorporated into the Greek legislature in 1995. Finally, a committee was established in 1996 for the implementation of these directives. In this committee the participants were the Ministry of Environment, Planning and Public Works, the Ministry of Health, the Ministry of Agriculture, the General Chemistry Laboratory of the State, the Ministry of Development and two scientific experts (Caloghirou & Zambarloukos, 2000).

Public concern about biotechnology increased sharply in the years 1996 and 1997 regarding the GMOs issue. In parallel, the cloning of Dolly received high attention from mass media and triggered debates both on the press and television concerning ethical issues and possible risks of cloning and of biotechnology in general. Meanwhile, the National Hellenic Research Foundation organised a conference on biotechnology in relation to society and the environment and a panel discussion on social and ethical aspects of biotechnology (Marouda-Chatjoulis *et al.*, 1998).

A key turning point for the public concern on biotechnology was the experimental cultivation of GM crops in certain parts of Greece. When Greenpeace revealed that a large shipment of GM Soya beans was imported from the USA, the issue has begun to receive some media coverage. In 1996, Zeneca (now Syngenta) filled a permission request to develop GM tomatoes. One year later, the committee responsible for such activities (see above) granted the requested permission. But Greenpeace via a protest march forced the revocation of the permission (Marouda-Chatjoulis *et al.*, 1998). This sequence of events received high publicity, causing an informal national dialogue especially in the media. Nevertheless, Caloghirou and Zambarloukos (2000) report that four more experimental cultivations (three of cotton and one of corn) were approved among twelve requests in 1998. In the echo of these events, the public attitude towards biotechnology seemed to become more and more negative. However, consumer and environmental groups began to demand a stricter application of the law and particularly a labelling of all products containing GMOs (Caloghirou & Zambarloukos, 2000; Marouda-Chatjoulis *et al.*, 1998). Finally, in 1999 the Ministry of Environment decided not only to reject all applications for experimental crops in that year but also to ban all experimental cultivations for two years.

In 1998, the National Commission on Bioethics was established to be responsible for consulting the government on health, environmental and ethical issues about biotechnology. Among other tasks, the members of the Bioethics Commission participate in public discussions as well as in debates on television and the press (Sakellaris & Moses, 2000). Subsequently, three more committees were set up, one by each of the concerned Ministries: the Ministry of the Environment, the Ministry of Health and the General Secretariat of Research and Technology (Caloghirou & Zambarloukos, 2000). Responding positively to an intense public anxiety, the government and more specifically the Ministry of the Environment, in April 1999, announced that the General Secretariat for the Consumer would begin investigations to ensure that products containing GMOs

include information on their labels about their ingredients (Caloghirou & Zambarloukos, 2000).

Public perceptions of biotechnology

In the first half of this period, public awareness and participation were still minimal. In fact, until the mid 1990s, Greeks were the least informed among Europeans on issues regarding biotechnology (Caloghirou & Zambarloukos, 2000; Marouda-Chatjoulis *et al.*, 1998). In the Eurobarometers of 1991, 1993 and 1996, Greeks were holding the lowest score in understanding biotechnology. Furthermore, besides some public announcements, the state was doing very little to promote the public debate on biotechnology or to raise relevant issues concerning citizens.

However, limited and delayed awareness has not resulted in an initial negative stance about biotechnology. Regarding this, the EBIS project report (Caloghirou & Zambarloukos, 1999) states: “In contrast to what is commonly assumed, the low level of information regarding biotechnology has not resulted in a negative view of biotechnology. Biotechnology was generally looked upon in a positive way.”

In the Eurobarometer of 1996, the Greek public was relatively positive on the usefulness of biotechnology in general. In particular, biotechnology was considered as having potentially positive effects in medical applications but the public was more sceptical about applications in the Agrofood and transplantation sectors (Caloghirou & Zambarloukos, 2000). When the question was about the ‘morality’ of biotechnology, the positive opinions were significantly fewer, with the exception of the genetic testing for inherited diseases. Regarding the risk assessment of applications of modern biotechnology, in the same survey, Greeks appeared to be highly concerned of the risks on food production and less on crops, plants or medicine use. There was also a concern about the potential risk of transplantation. In general, Greece was just below the average of EU-15 regarding usefulness of biotechnology, while in the overall risk assessment Greece was ranked the second to the end only above Finland. On the overall moral acceptability, Greece scored 54%, when the EU-15 average was 55%.

In the next Eurobarometer results of 1999, the Greek public was situated in the ‘lowest limit’ among Europeans on four of the seven reviewed Biotech applications with respect to their usefulness: food production, cloning animals, human genes into bacteria and human tissue cloning. Especially, in the first two applications, Greeks seem to ‘mostly disagree’. In the risk assessment, Greeks were especially uneasy with respect to food production but they were identifying the lowest risk (with Finland) in the detection of hereditary diseases. On the moral aspects of biotechnology, Greece achieved the lowest scores. Greeks seem to have the lowest moral acceptability for five out of seven biotechnology applications. The only two exceptions were in gene transfer between plants and detection of hereditary diseases. The Greek public had also the lowest averages in the encouragement of four out of seven biotechnology applications: food production, cloning animals, human genes introduction to bacteria and cloning human tissue for medical purposes (Eurobarometer, 1999).

Setting the agenda

In the period since 1989, various ministries are involved in policy making on biotechnology but the most important actor is the General Secretariat for Technology and Research (GSRT) under the Ministry of Development. GSRT has the general responsibility to design R&D policy and to set priority areas and target goals. It finances universities, research institutes, private sector research, as well as agricultural research institutes of the National Agriculture Research Foundation. GSRT supports 17 research institutes, 12 technological institutes and 4 science parks. GSRT's funding is provided mainly through competitive research programmes. Along with GSRT, there are three other Ministries involved indirectly in research policy by providing additional funding to various institutions, which conduct research on ministry-related issues. These are the Ministry of Education and Religion, the Ministry of Agriculture and the Ministry of Health.

The Ministry of Education and Religion, which has the biggest share in the research funding, is the main financier (through the regular state budget) of public universities, technological institutes and specialised university-based institutes.

The Ministry of Agriculture plays an important role in funding the National Foundation for Agricultural Research. It is important to mention that only GSRT and the Ministry of Agriculture support biotechnology research and development at Greek institutions through calls for programmes (Caloghirou & Zambarloukos, 2000). During 1997 and 1998, the National Agricultural Research Foundation was offering courses (typically of 150 hours duration) to farmers. Their syllabus included a description of biotechnology and its aims, basic biology and a discussion on the nature and applications of GM crops. In 1997, about 7.000 farmers attended those courses, 40% of which being devoted to biotechnology (Sakellaris & Moses, 2000). These courses were suspended for 1999 and 2000 but they were expected to restart under a new programme called Dimitra in 2001.

Furthermore, the Ministry of Health provides support for biotechnology research by funding the research centres of public hospitals.

In September 2002, the Greek Ministry of Justice brought a new draft of law on human reproduction to the Greek Parliament. This imminent law makes an effort to modernise further the Greek legal system on new biotechnological and medical advances, such as *in vitro* fertilisation (IVF), maintenance of genetic information, etc. This draft of law explicitly forbids human cloning for reproductive purposes while it permits cloning only for medical reasons and under austere conditions.¹ Until the adoption of the new law, according to members of the Bioethics Commission, since 1998 Greece is following the general directions of the European Council, as those were expressed in the Oviedo Convention on Human Rights and Biomedicine. This Convention explicitly forbids

¹ Daily Newspaper 'Eleytherotypia', Daily Newspaper 'TA NEA', 13/09/2002

human cloning for reproductive or research purposes, while it leaves open the cloning of other beings. Moreover, the Convention does not foresee any penalties for violators.²

According to the newspaper 'TA NEA', the issue of cloning for medical purposes was earlier a controversy among the members of the Bioethics Commission. However, as it is apparent from the aforementioned draft of law, the majority of the Commission's members did consent to exclude human tissues' cloning from the general forbiddance of cloning.

During the second half of the 1990s, NGOs like Greenpeace managed to raise public awareness on biotechnology and especially on those applications related to food production (GM food, Soya, experimental cultivations). Greenpeace, as well as other environmental groups, are opposing the use of GMO products. Campaigns and protests by Greenpeace and others played a significant role in shaping the public opinion. As a result, these organisations managed to upgrade their useful role as NGOs influencing the policy process both in the eyes of the public and the regulatory bodies. Nevertheless, public awareness did not result to public participation in the policy process. Lay people continued to be the invisible consumers of regulations coming from above (Greek state or EU) with no actual voice and role in the process. No public conference or other public participation procedure did actually take place in this period.

Inclusion and exclusion of public/civic participants

The main actors in the debates and decision-making processes during the 1990s were once again scientists. Scientists were appointed at the Greek Bioethics Commission (although not all of them are medical or biotechnology-related professors), scientists were invited on public television panels, scientists were organising scientific conferences and scientists were advising the Greek government on issues emerging from the advances of biotechnology.

The only new actors, especially in the GM food debate, were NGOs, such as Greenpeace, which at that time attracted a relatively high amount of public attention and press coverage through demonstrations and protests regarding the imported GM Soya seeds and the eventually rejected cultivation of GM tomatoes by Syngenta. Another prominent actor was the organisation E.K.Poi.Zo (Union of Consumers for Quality of Life). Generally, E.K.Poi.Zo uses conventional pressure measures such as press releases, conferences and interviews in mass media, as well as educational campaigns in primary and secondary schools. It has dealt with GM crops but it has never undertaken any specific product testing. The position of the organisation on GM food is that there is a need of testing in the case of animals for several years before the implementation of tests on human volunteers and finally of further tests on a limited portion of the public. Only if such a testing schedule is followed, this organisation would not have any objection provided that GM food carries explicit labels. Regarding gene testing, E.K.Poi.Zo appeals to the

² Daily Newspaper 'TA NEA', 27/11/2001

morality of the issue; it demands that insurance companies should not have access to personal genetic data. Furthermore, the organisation has some concerns about the value of advance warnings to individuals based on their genetic tests (Sakellaris & Moses, 2000).

Framing of issues

In the period since 1989, the role of scientists is once again obviously central in processes framing the contested issues. Scientists are invited on television discussions and contribute articles in newspapers in order to clarify topics of biotechnology and related issues like GMOs. Through popularisation of GM technology and cloning, citizens were informed about advances in biotechnology but also about potential risks. In fact, as we have mentioned earlier, this has led to a greater anxiety by the public, which in the 1999 Eurobarometer appeared to be last in optimism among all the EU publics with regards to the usefulness of and the risks emanating from most of biotechnology applications, i.e., agriculture and cloning.

Dr. Matsaniotis, emeritus professor of Pediatrics at the University of Athens and former President of the Academy of Athens, has pointed out in a speech in front of the Academy that ‘ignorance causes fear and creates superstitions. Therefore, society needs to be familiarised with science’s advances in order not to fear them. The average people is both interested in and able to understand scientific achievements, as long as they are presented to her reasonably and objectively.’³

In relation to biotechnology framing in Greece, two points should be stressed. The first is the enduring low public awareness of the Greek public and the second, which can in part be the reason of the first, is the lack of any specific governmental programme aiming to inform and educate the public (Moses *et al.*, 2002). Despite the more intensive promotion and coverage by the media of certain biotechnological issues, such as cloning, GMOs and DNA decoding, the Greek public does not seem to have considerably improved the levels of understanding on these issues. This is in parallel with the total lack of any biotechnological education policy in Greece, apart from universities, in which biotechnological education is an intrinsic initiative (Moses *et al.*, 2002). Mr. Deniozos, current head of GSRT, affirms this deficiency mentioning the existence of some future governmental plans on the popularisation of biotechnology (Moses *et al.*, 2002).

As mentioned earlier, a 1998 law has established the National Bioethics Commission composed of nine regular members, all academic personalities, and two supporting scientific assistants. The Commission is an independent advisory body, which is subject to the authorities of the Greek Prime Minister. Its mission is to explore the ethical, social and legal impact of possible applications of the biological sciences. In particular, it aims to investigate the various aspects of scientific advances in biology, biotechnology, medicine and genetics; to compose along with related ministries proposals of general policy and to provide scientific recommendations on related issues; to collaborate with

³ Daily Newspaper ‘TA NEA’, 18/02/1998

international organisations representing Greece in international fora; to inform the public on issues related to biotechnology and the impact of its applications; to orientate and coordinate related governmental advisory bodies in the field of bioethics.

The Commission runs an awareness website, where relevant announcements are regularly posted together with proposals, related scientific advances in Greece and other countries, information on conferences and links to other related scientific bodies, committees, NGOs, etc. Half of the members of the Commission are experts on medical or agricultural applications of biotechnology and genetics, one is a professor of sociology, one of theology, one of philosophy and two of criminal and civil law, respectively. Chairman George Koumantos is an emeritus professor of civil law at the University of Athens. So far, the Commission has made three recommendations on GM plants, genetic fingerprints and stem cells.

Media Coverage

From 1989 and onwards, media coverage on biotechnology issues has begun to rise. According to the survey of Marouda-Chatjoulis *et al.* (1998), the first three years are characterised by a focus on the medical benefits of biotechnology as well as by events taking place at a safe distance from Greece. Until 1993, the context of progress has dominated an increasing number of biotechnology articles, while risks were rarely mentioned. Furthermore, in this period, industry has emerged as a key stakeholder (Marouda-Chatjoulis *et al.*, 1998). From 1993 to 1996, the published articles about biotechnology have proliferated. However, biotechnology held more a peripheral role rather than a central issue in these articles. Moreover, a positive acceptance of biotechnology has continued in these articles. The fear of opening Pandora's box was rarely mentioned although a reasonable amount of articles were dealing with the ethics of biotechnology. While in the first years of the media coverage on biotechnology the fear of doom was accompanying the context of progress, it appears that in this second phase, especially in the years 1993-1996, biotechnology articles were dealing more with pragmatic issues and the entailing questions concerning morality and ethics. Dolly, the cloned sheep, and cloning in general have received extensive media coverage, especially in newspapers. More recently, the Human Genome Project and the identification of human DNA has received very high publicity both in newspapers and the electronic media, where experts regularly debate on the pros and cons of biotechnology.

Legal framework on biotechnology industries

The current legal framework in Greece does not explicitly make provision of the establishment and advancement of biotechnology related industries. However, these companies can benefit from the Law 1892/90, subsequently revised by the Laws 20/93 and 2234/94, which provide subsidies to firms wishing to create new units (a) in underdeveloped areas and (b) on sectors of particular interest. The latter category includes high technology sectors. Firms wishing to invest in biotechnology can apply for subsidies aiming to high technology sectors. GSRT is responsible to evaluate whether

proposed investments actually belong to the high-tech category. Provided subsidy ranges from 40 to 50% of the total investment. Since biotechnology is not recognised as an independent economic sector, it is not known whether firms wishing to apply biotechnology have benefited from the above Laws (Caloghirou & Zambarloukos, 2000).

Biotechnology related programs

In the second period of biotechnology policy-making in Greece, the following structural programmes were undertaken (GSRT, 1994, 1994b):

- EPET 1 (1989-1993): The aim of this programme was to link science with industry through the creation of scientific infrastructure (including research laboratories) and the enhancement of skills through education. In this programme, 4.1 million euros were spent for biotechnology R&D activities and infrastructure (Zechendorf *et al.*, 1996).
- STRIDE Hellas (1990-1994): Goals of the programme were to link Greek institutions of Science and Technology (S&T) with European and International Networks, to establish a native scientific network with the participation of industry, to improve the available infrastructure, to enhance technology education and mobility of scientists. In this programme, 6.4 million euros were spent on biotechnology (Zechendorf *et al.*, 1996).
- EPET II (1994-1999): This programme aimed to improve S&T research in such areas as biotechnology, to enhance industrial research and technology transfer through collaboration between industry and academia, to restructure and reorient S&T infrastructure and to enhance skills through education and mobility of scientists.

Under the EPET II umbrella, various programmes were funded, most of which were aiming to strengthen the collaboration between science and industry.

- EKVAN: It supported projects submitted by joint ventures of research organisations and private firms. During the first EKVAN call and EKVAN-P, 9.6 millions ecu and 12.3 million ecu, respectively, have been allocated for biotech projects. Through EKVAN second call (1998-2001), the corresponding amount was 12.3 millions ecu (Caloghirou & Zambarloukos, 2000).
- PAVE: Its target was to advance industrial research. In this programme, 1.3 millions ecu were spent for biotechnology since 1994 (Caloghirou & Zambarloukos, 2000).
- PENED: It aimed to enhance human research potential via training and mobility. In this programme, 0.9 millions ecu were spent on biotechnology (Zechendorf *et al.*, 1996).
- YPER: It financed research fellowships. In this programme, 0.49 millions ecu were spent during 1996-98 for biotech doctoral research, in which 25% of the funding came from industry.
- SYN: It promoted cooperative projects between the research community and industry; 50% of each project's budget was contributed by industry. Approximately 1.83 millions ecu were spent under this programme during 1995-1996 and 1998-1999 (Caloghirou & Zambarloukos, 2000).

Under the new Operational Program for Competitiveness (EPAn) 2000-2006, which finances projects on research and technology development in domains of high importance for the Greek economy, there is a priority sector, named Biomedicine, which is expected to encompass medical applications of biotechnology (GSRT, 2002).

Industry and state funding

Industries specialising exclusively on biotechnology applications do not exist in Greece. Local branches of multinationals define the marching command trying to impose their own rules in the market (Moses *et al.*, 2002). In the GMOs case, the government was unprepared to deal with the Zeneca application for experimental cultivations, as its palinodes have shown. The lack of demand of know-how and applied expertise has affected the scientific community. Subsequently, the latter is seeking collaborations with multinationals or foreign firms, mostly on the EU level. This fact tends to insulate scientists from the local context in which they are situated (Moses *et al.*, 2002).

The amount of state money targeting to biotechnology research has never exceeded the 9% of the total R&D state funding, which in turn has always been one of the lowest percentages among EU member countries (0.5% of GNP). Thus, the relatively small number of businesses applying biotechnology is not a surprise. These few business activities are mostly concentrated in fermentation technology, plant genetics, diagnostics, protein engineering and enzyme technology, microbial genetics and marine biotechnology (Moses *et al.*, 2002). Since the unsuccessful endeavour of Biohellas SA in the mid 1980s, no other explicit biotechnological company has been founded in Greece. The previous examples of businesses, just using modern biotechnology techniques and materials, can be regarded as the only biotechnology companies.

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