BioPolis - Inventory and analysis of national public policies that stimulate research in biotechnology, its exploitation and commercialisation by industry in Europe in the period 2002–2005

National Report of Cyprus

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Summary

Cyprus is a very small island state and, although it has a small economy, it is a high-income country. The country's 2002 GDP was 11 073M EUR. Despite its optimistic economic performance, its Gross Domestic Expenditures on R&D (GERD) only amounted to 33 793M EUR (representing 0.32% of its GDP), with a public contribution of 61.65% and private contribution of 17.42%.

The country does not have a well-established biotechnology sector. The level of S&T research had been low in Cyprus. However, in recent years, the Cypriot government has initiated a number of catalytic measures aimed at stimulating S&T. Firstly, the Research Promotion Foundation was established in 1996 in order to coordinate and support research activities in Cyprus. Secondly, in 1999, the Ministry of Commerce, Industry and Tourism published the 'New Industrial Policy', which still remains an effective policy. Thirdly, also in 1999, Cyprus entered the 5th Framework Programme for Research, Technological Development and Demonstration Activities of the European Union. This helped to expand research activities conducted by Cypriot scientists, enabling them to create networks of cooperation and interact with their European colleagues.

In addition, the government of Cyprus is undertaking three steps: (1) the establishment of research centres, which constitute an essential prerequisite for the production of knowledge and innovative ideas; (2) the creation of new enterprises of high technology and innovation, which enhance the potential for high value-added production in terms of knowledge and know-how (the initiative is supported by four business incubators); and (3) the establishment in 2008 of a Science Technology Park, which will host future research centres, business incubators and spin-off innovative enterprises and constitute the infrastructure nucleus for the development of research.

Despite the fact that the government, in recent years, has placed a high priority on new high technologies, the country has never had specific policies for stimulating biotechnology. The three major policy frameworks in support of science and technology research do not specify biotechnology as a priority. However, biotechnology research is eligible for funding under these policy frameworks. Although Cyprus has so far not developed a biotechnology programme, a number of biotechnology research activities have already been publicly funded through non-policy-directed instruments.

In terms of performance in creating a knowledge base, over a period of ten years, Cyprus had steadily increased its output of biotechnology publications per million capita from index 24 in 1994-1996 to index 39 in 2002-2004. Cypriot output was nevertheless modest and far below EU25 and USA levels. Although the number of Cypriot biotechnology publications was limited, in relation to the total number of publications it remained at the same level as the EU25 average and was only slightly lower than USA figures. Cypriot biotechnology publications can especially be found in the field of human health and in generic biotechnology. Human health saw the biggest growth rate in the ten years covered.

In terms of performance in knowledge transmission, for biotech patent applications per biotech publications, the output of Cyprus significantly declined in the ten-year period (from index 57 in 1994-1996 to index 17 in 2002-2004). Cyprus performed far below EU25 and USA levels in this regard. In terms of biotech patents per million capita, Cypriot output likewise declined over the ten years (from index 14 in 1994-1996 to index 6 in 2002-2004), again far below EU and USA levels.

In 2005, there were no immediate plans regarding the specific funding of biotechnology at national level. However, according to the Research Promotion Foundation (RPF), the government would continue to invest in biotechnology, now considered a very important sector. Biotechnology-related projects would also continue to be funded under the RPF 2006 Programme and European framework programmes.

1. Introduction and background

1.1 General introduction

Cyprus is a very small island state with a total land area of 9 240 km^2 and about 730 400 inhabitants (Eurostat, 2005). It lies in the eastern Mediterranean Sea, 113 kilometres (70 miles) south of Turkey and around 120 km west of the Syrian coast (Wikipedia, 2005). Although Cyprus has a small economy, it is a high-income country. Its gross value added (GVA) was approximately 8 457M EUR in 2002. The economy is service-oriented and employs 67% of the population. Trade and financial intermediation are the biggest sectors, with contributions to GVA of 32.67% and 23.19% respectively (Eurostat, 2005). The private sector leads the country's production, which generally consists of small and family-run businesses (EU TrendChart, 2004). Agriculture and fisheries only contribute 4.24%. However agriculture products such as potatoes, citrus fruits, vegetables and olives represent 30% of total domestic exports. EU countries are the major export markets of Cyprus (FAOSTAT, 2004).

As a very small state, Cyprus has to specialise in a few niche markets to continuously enhance its economic competitiveness. So far, a knowledge-based economy is emerging as the only alternative to the traditional low added value of services and agriculture. The government is seeking appropriate policy measures for knowledge generation and dissemination, for instance through priority measures in ICT (EU TrendChart, 2004).

The country's 2002 GDP was 11 073M EUR. Despite this optimistic economic performance, its Gross Domestic Expenditures on R&D (GERD) only reached 33.793M EUR (0.32% of the GDP), with a public contribution of 61.65% and private contribution of only 17.42% (Eurostat, 2005) The rest of the funds came from overseas (13%), private non-profit organisations (4%) and private higher education (3%) (Nanoforum, 2004).

The country does not have a well-established biotechnology sector. In general, Cypriot firms are characterised by relatively low research and innovation capabilities, coupled with low demand for contract research with national research institutes and universities. There is only a limited link and few joint research undertakings between the public and private sectors (Musyck and Hadjimalonis, 2005).

1.2 Characteristics of national S&T and innovation system

The level of S&T research has been low in Cyprus. For instance, the University of Cyprus was only established in 1988 and opened to students in 1992. Up until the early 1990s, there was very little incentive for national financing of science and technology. This was provided directly through the annual Development Budget of the Republic (EU TrendChart, 2004). However, in recent years, the Cypriot government has initiated a number of catalytic measures aimed at stimulating S&T. Firstly, the Research Promotion Foundation was established in 1996 in order to coordinate and support research activities

in Cyprus. Secondly, in 1999, the Ministry of Commerce, Industry and Tourism published the 'New Industrial Policy', which still remains an effective policy.

The policy's main aims are the following:

a) Assistance to existing and promotion and development of new high-tech industries,
b) Assistance and reconstruction of Cypriot traditional industries,
c) Attraction of capital-intensive foreign investments.

Thirdly, in 1999, Cyprus entered the 5th Framework Programme for Research, Technological Development and Demonstration Activities of the European Union. This contributed to the expansion of research activities by Cypriot scientists, enabling them to create networks of cooperation and interact with their European colleagues.

The period 2000-2004 was dominated by preparations towards full accession to the EU. Cyprus used the experience of other EU countries to prepare its own policy on research and technology innovation. This has had an influence on Cyprus's financial provisions and priorities. According to a representative of the Cypriot Ministry of Commerce, Industry and Tourism, the government of Cyprus aims to transform the country into a regional hub for research and technology.

The government is undertaking three steps towards the achievement of this goal: (1) the establishment of research centres, which constitute an essential prerequisite for the production of knowledge and innovative ideas; (2) the creation of new enterprises of high technology and innovation, which enhance the potential for high value added production in terms of knowledge and know-how (the initiative is supported by four business incubators); and (3) the establishment in 2008 of a Science Technology Park, which will host future research centres, business incubators and spin-off innovative enterprises, and constitute the infrastructure nucleus for the development of research.

Policy Frameworks for S&T support

There are three major policy frameworks in support of science and technology research:

- the New Industrial Policy,
- the Cyprus Planning Bureau's Strategic Development Plan 2004-2006, and
- the Research Promotion Foundation's Framework Programme 2003-2005 (EU TrendChart, 2004).

The New Industrial Policy was launched in 1999 and still remains effective today. Its main objectives are the provision of support for restructuring traditional industries and attracting high-tech industries and foreign investment. It consists of 12 chapters, the first two relating to high technology. Chapter 1, entitled 'High Technology Business Incubators', provides support to develop and commercialise new innovations. Grants of up to about 210 000 EUR per project are provided. Chapter 2, entitled 'High Technology-Research and Development (R&D)', is focused on applied research and development in specific high-technology fields where Cyprus has a comparative advantage. The Cypriot government planned to have 5 business incubators for 2002-2004, with an investment of

87 000 EUR. For the same period, the government also planned to invest 204 000 EUR in the development of high technology projects for start up companies (Rolaids in Nanoforum, 2004).

The Cyprus Planning Bureau's Strategic Development Plan 2004-2006 is the key policy document describing overall government priorities and actions. It constitutes the basis of the country's programming, including actions and schemes proposed for co-funding by the Structural Funds, the Cohesion Fund and other Community initiatives of the EU.

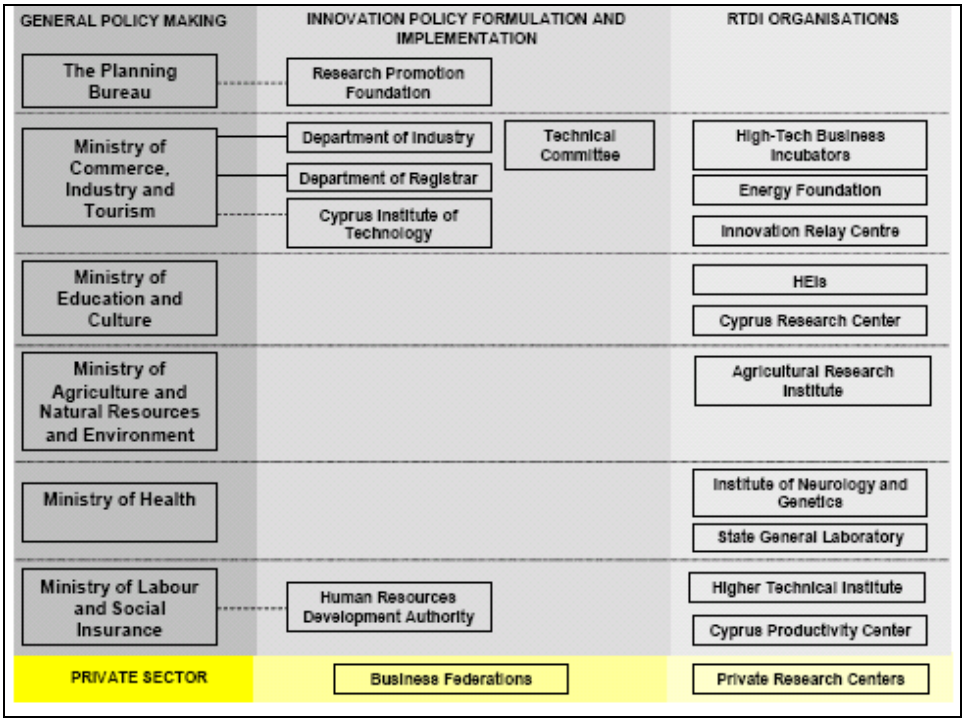
The five priorities of the Planning Bureau are:
1. Extension and upgrading of infrastructures,
2. Enhancing competitiveness,
3. Human Resources Development,
4. Balanced rural development,
5. Protection of the environment and upgrading of quality of life.

Priority no. 2 on *enhancing competitiveness* mentions that 'the Government will also promote specific measures, targeting, inter alia, the utilisation of modern technology and the promotion of innovation, the improvement of productivity, as well as the specialisation of enterprises in the promotion of high quality and high value added goods and services'. *Enhancing competitiveness* has four priority pillars, the fourth being: enhancing research, technology and innovation. This pillar has four measures; the third measure, which deals with strengthening innovation and technology transfer, includes the 'provision of incentives for the creation of new high technology and innovative enterprises through business incubators'.

The science and technology policy of the government is new and still in the process of being fine-tuned. The current policy is shifting away from institutional allocation of funding towards the promotion of open competitive grant schemes.

The responsibilities in the design, promotion and coordination of policy measures for science and technology research and innovation are structured at policy, intermediary and implementation levels (EU TrendChart, 2004).

Figure 1.1 Overview of the innovation governance system in Cyprus



Source: European TrendChart on Innovation, National Report of Cyprus, 2004/2005

Figure 1.1 gives an overview of the innovation governance system in Cyprus. The three main actors at the policy level are the Planning Bureau; the Ministry of Commerce, Industry and Tourism; and the Technical Committee.

The Planning Bureau is the economic and administrative arm of the Central Planning Commission, which is answerable to the President's Office and the Planning Committee on Policy and Budget under the Ministry of Finance. The Planning Bureau plays a major role in the coordination of government policy and is responsible for overall economic planning. It is the national agency engaged in the coordination of research priorities in Cyprus. It is directly involved in strategy formulation, objectives setting and introduction of policy measures. The national industrial policy and basic priorities in research fall under the economic planning. In addition, the Planning Bureau acts as a policy link between the Cypriot government and the European research and innovation programmes. It provides annual funding to the Research Promotion Foundation (RPF).

The Ministry of Commerce, Industry and Tourism (MCIT) is responsible for the New Industrial Policy. It is responsible for the promotion of high-tech companies through incubators and industrial research and development. It is also responsible for the reconstruction of traditional industry and attraction of foreign investment. Finally, it acts as the intellectual property authority and national patent office.

Within the MCIT is the Technical Committee, which is composed of representatives of the MCIT, Cyprus Institute of Technology, Planning Bureau, RFP, University of Cyprus,

Cyprus Chamber of Commerce and Industry, and Cyprus Employers and Industrialist Federation. The representatives are appointment by the Council of Ministers. The Technical Committee is responsible for the promotion of high-tech industry, including biotechnology. It studies options for the development of viable high-tech industry and advises the government on how to improve the country's attractiveness for foreign direct investments in these sectors.

Other Ministries such as the Ministry of Health and the Ministry of Agriculture, Natural Resources and the Environment support and promote research that is relevant to their sectors. The Ministry of Education and Culture and the Ministry of Labour and Social Insurance support and promote the development of educated, qualified and skilled human capital essential for the development of science and technology.

At the intermediary level, the two major actors are the Research Promotion Foundation (RPF) and the Cyprus Institute of Technology (CIT).

The Research Promotion Foundation serves as the national research council. RPF is an independent organisation governed by a Board of Directors that is appointed by the Council of Ministers. It is chaired by the Permanent Secretary of the Planning Bureau and provides funding for the implementation of research projects. The 2003-2005 RPF Framework Programme had an overall budget of 34M EUR, 20M EUR of which was the RPF's own contribution (EU TrendChart, 2005).

The specific objectives and priorities (RPF, 2005) are to:

- Monitor and coordinate scientific and technological research in Cyprus,
- Identify appropriate thematic areas for conducting demand-driven research, taking into consideration the developmental needs of Cyprus,
- Provide funding for the implementation of research projects,
- Promote the participation of Cypriot research organisations in European research programmes,
- Evaluate the potential of organisations or individual researchers to carry out research,
- Advise the government on research issues,
- Upgrade the infrastructure for research activities, and
- Promote awareness among Cypriots about the importance of research in contemporary societies.

RPF has developed measures for supporting Cypriot researchers, enterprises, and institutions, and promotes their participation in the European programmes. In addition, it has developed measures that encourage the participation of Cypriot researchers in the activities of the Joint Research Centres (JRCs) of the European Union as well as the International Association for the Promotion of Cooperation with Scientists from the newly independent states of the Former Soviet Union (INTAS) (ibid).

The Cyprus Institute of Technology (CIT) was established by the Ministry of Commerce Industry and Tourism, Cyprus Chamber of Commerce and Industry, and Employers and

Industrialist Federation. CIT is an independent agency whose mission is the promotion of competitiveness and technological upgrading of all sectors of the Cypriot economy. In 2000, CIT established the Innovation Relay Centre (IRC), which is part of the network of Innovation Relay Centres in Europe (EU TrendChart, 2005).

Not mentioned in Figure 1.1., but a relevant actor is RTD Talos, it provides information, technical support, counselling and training services in research and development, technology assessment, technology transfer, innovation management, start-up, and innovation financing. RTD Talos links SMEs to industry, academia, financial institutions and public authorities. It hosts the National Contact Point for SMEs for the 6th EU Framework Programme (RTD Talos, 2006). RTD Talos is a co-owner of ERMIS Research and Incubator Centre, a leading business incubator in Cyprus, which hosts a number of successful biotechnology companies/spin-offs (D.T. Diabetes Research Technologies Ltd, Medsonic Ltd and Embio Ltd).

In 2000, RTD Talos Ltd. was established as a private sector initiative to assist Cypriot enterprises, especially small and medium enterprises (SMEs), in exploiting the opportunities and addressing the challenges that result from Cyprus' accession to the EU, and in competing in the common market. There are other private business incubators such as the Promitheas Business Innovation Centre, ERMIS Research and Incubator Centre, and the Helix Business Incubator, Ltd. The University of Cyprus also host the Diogenes Business Incubator.

Research institutes operate at the implementation level. Those active in biotechnology are presented in section 1.4.

1.3 National support and framework conditions for biotechnology

Although Cyprus does not have a long history of science and technology research, the high frequency of an inherited health condition amongst the island's inhabitants necessitated the adoption of a national genetic diagnostic programme. Cyprus has an increased frequency of an inherited disorder, namely β-Thalassaemia. This is a major haemoglobin disorder that results in significant psychological and physical stress and a short life span. One in seven Cypriots is a carrier of this genetic disorder. Hence, for 45 years the government has been actively supporting research and the implementation of a specific programme to control the disease. The successful 1972 Cyprus Thalassaemia Programme included health education and community involvement, genetic screening and population genetic screening (Bornik and Dowlatabadi, 2004). In 2000, the Cyprus Institute of Neurology and Genetics (CING) was established as a bi-communal, non-profit medical, diagnostic, research and academic institution that provides specialised services and research in neurology, genetics, DNA forensics, molecular biology, histopathology and virology for all kinds of inherited disorders. According to a representative from CING, the Cypriot Ministry of Health provides annual institutional financial allocations to CING. About 31% of this fund is used for biotechnology research.

Despite the fact that, in recent years, the government has placed a high priority on new high technologies, the country has never had specific policies for stimulating biotechnology. By contrast, it has a clear priority and specific plans for the promotion and development of information and communications technology (ICT). The three major policy frameworks in support of science and technology research (see section 1.2) do not specify biotechnology as a priority. However, biotechnology research is eligible for funding under these policy frameworks.

For example, the Ministry of Commerce, Industry and Tourism (MCIT) has introduced two programmes for the creation of new enterprises of high technology and innovation, through the Institution of Business Incubators. One of the areas of interest is biotechnology. The estimated budget for biotechnology is 300,000 EUR.

Framework conditions
The use of genetically modified micro-organisms (GMOs) in research had been restricted to medical diagnostic purposes. At that time, the Ministry of Labour and Social Insurance (Department of Labour Inspection) enforced the legislation on health and safety at work which, among others, covered risks from biological agents and GMOs (UN, 2002). At present, the Environment Service of the Ministry of Agriculture, Natural Resources and the Environment is mandated to ensure enforcement and coordination of European policy and legislation on the environment. The Environmental Service is the national focal point for inter-governmental organisations for a number of international conventions, including the Cartegena Protocol on Biosafety which has been ratified by Cyprus (No.7 (III)/2003). The House of Representatives voted a law (No. 160(I)/2003) controlling the importation, placing in the market and deliberate release in the environment of genetically modified organisms. Other regulations include the 1998 Seeds Law, which covers the registration of genetically modified seeds, and Law No. 150(I)/2001, which established a national Bioethics Committee (Ministry of Agriculture, Natural Resources and the Environment, 2005).

With regard to stem cell research, Cyprus has no specific legislation regarding human embryo research or human ES cell research. In Cyprus, it is prohibited to create human embryos for research purposes and the procurement of stem cells. The Bioethics Committee has recently been debating the issue of stem cell research (Matthiessen-Guyader, ed. 2004).

The State General Laboratory (SGL) is an independent department of the Ministry of Health. Its primary work is testing for quality control, but it also engages in applied research. It has 21 laboratories. One of these is the GMO laboratory, which acts as the State's official control laboratory for testing foodstuffs for the detection/quantification of GMOs according to regulation 1829/03/EC. It is a member of the European Network of official control laboratories (SGL, 2005).

Public acceptance
A survey conducted by the Eurobarometer showed that 68% of Cypriot respondents believe that biotechnology and genetic engineering will have a positive effect on their

way of life over the next 20 years. Cyprus ranked high on the optimism scale among EU25 countries. Specifically on high-tech agriculture and medicines and new medical technologies, 80% and 95% of Cypriot respondents respectively expressed optimism. Nevertheless, like most EU members, Cypriot optimism in biotechnology and genetic engineering is tempered by ethical values, especially with regard to specific applications.

Table 1.1 Cypriot approval rating of new technology applications (in %)

Topics for consideration	Never	Only in exceptional circum-stances	Only if highly regulated and controlled	In all circum-stances	DNK
Animal cloning for research into human diseases	39	19	28	12	
Human cloning so couples can have a baby despite a genetic disorder	59	20	16		
Cloning human stem cells from embryos for organ transplants	38	16	28	15	
Growing meat from cell cultures to avoid the slaughter of animals	88	4	4		3
Developing GM crops to increase the variety of regionally-grown foods	56	10	19	8	6
Developing GM bacteria for cleaning up environmental catastrophes	29	19	23	19	10

DNK: Do Not Know
Source: Eurobarometer, 2005

The Eurobarometer survey showed that the citizens of Cyprus are rather critical of biotechnology applications for production of food and the cloning of animals and human cells from embryos. However, they are more receptive to using GM bacteria for cleaning up the environment.

With regard to genetic data, the Eurobarometer indicates that Cypriots are generally open to it being used for purposes of developing genetic-related treatments. Moreover, in terms of using the population's genetic data to study the genetic causes of human diseases, only 15% of respondents said that they would never approve it. This tolerance might be explained by the high incidence of the genetic disorder β-Thalassaemia in Cyprus and successful results of the government's relevant diagnostic programme for its elimination.

1.4 The main biotech policy and research actors

The policy actors in biotechnology are the policy actors described in section 1.2. Specific to biotechnology research, the four main actors are the University of Cyprus, the Cyprus

Institute of Neurology and Genetics (CING), the Agriculture Research Institute (ARI) and the Higher Technical Institute. As mentioned in section 1.3, CING was established to provide medical research and related services for all kinds of inherited genetic disorders, such as β-Thalassaemia.

The University of Cyprus operates as a public corporation and is the only officially-recognized university in the country (Musyck and Hadjimalonis, 2005). In 2003, the University started a postgraduate course in biotechnology. Mainly through its Department of Biology, and often in collaboration with CING, it conducts research in the fields of medical genetics and molecular nephrology; it also carries out genetic research aimed at improving health in Cypriot society and contributing to technological advancement in the country.

The Department of Biology was established in 2002 and focuses on areas of biology that have applications for medicine. The department's research is funded through the RPF and EU Framework Programmes.

The following laboratories of the Department of Biology are active in the field of biotechnology / life sciences:

- The Laboratory of Cancer Biology and Chemoprevention conducts research on identifying new molecular targets for anti-tumour drugs. The laboratory focuses on the identification of natural food components that may prevent or delay the process of carcinogenesis.
- The Molecular and Medical Genetics Laboratory investigates inherited kidney disease and familial Mediterranean fever.
- The Laboratory of Biotechnology and Molecular Virology aims to understand the implication of viral and host determinants on the transmission and progression of HIV-1 and the dynamics of cellular and viral drug-resistance in patients treated with anti-retroviral therapy.
- The Laboratory of Molecular Biology and Biochemistry focuses on the kinesin-like super family of microtubule-based motor proteins, including determining their role in neurodegenerative diseases.

Other laboratories include: (a) the Cytomolecular Genetics and Embryology Laboratory, which investigates the genetic and cellular basis of embryogenesis and embryo survival, with special focus on the influences of extra-embryonic tissues and stem cell biology; (b) the Laboratory of Developmental Biology and Bioimaging Technology, which studies the mechanisms underlying the formation of the complex embryonic architecture and also explores the applications of nanotechnology in the life sciences; and (c) the Bioinformatics Research Laboratory that focuses on the elucidation of protein sequence to structure/function relationships through large-scale analysis of genomic data.

The Agriculture Research Institution (ARI) is a department of the Ministry of Agriculture, Natural Resources and the Environment. ARI undertakes applied and basic research within the wider domain of plant and animal production. It is organised in eight sections, i.e. field crops, horticulture, plant protection, plant pathology and

biotechnology, soils and water use, animal production, statistics and computers, and agricultural economics. It is the sole institution engaged in agricultural research and depends almost exclusively on government funding.

The Higher Technical Institute operates under the Ministry of Labour and Social Insurance. Its main purpose is to provide training at the higher technician level in civil, electrical, mechanical and marine engineering and computer science. Two of its departments conduct biotechnology research. The computer studies department of the Higher Technical Institute conducts research on the generation of computer programmes for geometric and topological DNA chains of 3D objects. In addition, the mechanical/marine engineering department conducts research on thermochemical processing for the synthesis of nanostructured composite powders and the consolidation into net-shaped parts and thermal deposition (HTI, 2006).

2. Funding of biotechnology R&D, transfer and commercialisation

2.1 Introduction

This report reviews the funding of biotechnology research and commercialisation. In the report we make a distinction between policy-directed funding and non-policy-directed funding of biotechnology.

Policy-directed funding includes funding directed by explicit policy decisions about specific instruments, such as R&D programmes, programmes encouraging collaboration, industrial research grants, support for centres of excellence, support for commercialisation of research, support for start-ups, programmes encouraging mobility of researchers, programmes with open calls, *etc*. This policy-directed funding can include biotechnology-specific policy instruments and generic policy instruments. Biotechnology-specific policy instruments are instruments specifically set up to stimulate biotechnology. Generic policy instruments are not linked to a specific technology, but in principle stimulate all technologies, including biotechnology. The BioPolis project only considers those generic instruments that make a reference to (the stimulation of) biotechnology activities in the policy of the funding organisation running the programme, or that of the ministry/government department itself.

Non-policy-directed funding of research is linked to structural government support for scientific education, research and research infrastructure. This type of funding is mainly given through block grants to universities and (government) research institutes and the open-call system of research councils. Research councils, research institutes and government research institutes develop their own programmes through which biotechnology may be supported. The BioPolis project only considers funds allocated through block grants to (government) research institutes and through the open-call system of research councils.

This chapter describes the funding of biotechnology research through policy and non-policy-directed instruments, and of biotechnology commercialisation through policy-directed instruments. Data were collected through desk research (publications, documents, websites of national and regional public funding organisations and/or governmental departments), a survey of representatives of funding organisations that manage generic and biotech-specific programmes, and interviews with representatives of organisations that are involved in non-policy-directed and policy-directed funding. The websites of the funding organisations and their programmes and the names of contact persons who participated in the survey and/or were interviewed can be found in Annex 3 (List of Contact Persons) and Annex 4 (References). Section 2.2 presents non-policy-directed funding, and section 2.3 policy-directed funding. Charities also play an important role in the funding of biotechnology research in some countries; these are addressed in section 2.4. The final section provides a short overview of European funding of biotechnology research in Cyprus through the 6th Framework Programme.

2.2 Non-policy-directed funding of biotechnology research

Table 2.1 presents an overview of the two funding organisations providing non-directed funding for biotechnology, and the budgets they have spent on biotechnology in the period 2002-2005. The funds are from the RPF and budget allocated to CING by the Ministry of Health.

Table 2.1 Non-policy-directed funding of biotechnology research during the period 2002-2005 (M EUR)

Funding organisation	Public research institutions / Response mode programmes	Funds
RPF	Thematic actions (technology - health) Programme for the Support of Young Researchers Bilateral agreements Research infrastructure	5.1
Ministry of Health	Institutional budget allocation to CING	1.38

Source: BioPolis Research

2.3 Policy-directed funding of biotechnology research and commercialisation

Cyprus does not have a biotechnology programme. While the national science and technology policy is focused on stimulating and supporting high tech industries, policy documents have made no special reference to biotechnology. In this context, there has been no funding of biotechnology through generic instruments.

2.4 Charities

Charities are particularly active in funding health-related research. Table 2.2 provides an overview of funding for biotechnology research at CING.

Table 2.2 Overview of biotechnology stimulating instruments used by charities in the period 2002-2005

Instrument	Charity	Duration	Budget (EUR)*
Specific R&D programmes (awarded, after open calls for proposals, to the various departments of CING	Muscular Dystrophy Association (Cyprus)	2 to 3 year grants	52 000
	National Multiple Sclerosis Society		355 390
Specific R&D programmes (awarded to departments of CING)	The Cyprus Anticancer Society	Usually 2-year grants	95 349
	Telethon (Cyprus)		173 361
	Anastasios G. Leventis Foundation		164 693
Educational programmes	~~Anastasios G. Leventis~~	n.a.**	~~216 700~~

Instrument	Charity	Duration	Budget (EUR)*
	Foundation		
	Cyprus Kidney Association		97 082

* 2005 exchange rate
** n.a.: data not available
Source: BioPolis Research / CING pers.com.

2.5 Participation in 6th Framework Programme and use of development funds

Table 2.3 presents Cyprus' involvement in the Framework Programme. Although in terms of actual involvement, the figures may seem low, Cyprus has been steadily increasing its participation. For instance, the Agreement under the 5th Framework Programme amounted to approximately 9M EUR, and was aimed at facilitating the participation of Cypriot companies and research entities in the RTD programme of the European Union. This programme allowed the creation or strengthening of links between training and research establishments in Cyprus and the European Union. The participation of Cyprus in FP5 was highly successful, with approximately 20M EUR being allocated to the country for its participation in around 200 research projects. Furthermore, under FP6 (2002-2006), 127 research projects with Cypriot participation were approved for financing, involving 22.5M EUR. This accounted for the whole FP6 programme. With respect to biotech-related activities, Cyprus participated in 8 (of the 8537) projects funded under thematic priority 1 (Life sciences, genomics and biotechnology for health) and in 7 (of the 1599) projects funded under thematic priority 5 (Food Quality and Safety). In the EU's monitoring report of 2004, it is reported that Cyprus ranks first among EU25 members in terms of the amount of funds secured per researcher.

Table 2.3 Involvement of Cyprus in biotechnology/life sciences programmes of the 6th Framework Programme

Sixth Framework Programme[1] Thematic priority	**Participations as coordinator**	**Participations as member of the project team[2]**
1. Life sciences, genomics and biotechnology for health	0	8 (0.09%)
2. Nanotechnologies, section bionanotechnology	0	0
5. Food quality and safety	0	7 (0.44%)

Source: BioPolis Research
[1] First and second call, all types of projects
[2] Persons/groups can participate in more projects, resulting in more participations

3. Performance of the national biotechnology innovation system

3.1 Introduction

This chapter analyses the performance of Cyprus' biotechnology innovation system for two or three time periods (depending on data availability), as shown by a range of indicators for scientific and commercialisation performance. Each time period includes several years to avoid capturing erratic trends. National trends are benchmarked against the performance of EU25 member states and the USA.

The presentation of the performance is structured along four main policy areas being considered in the BioPolis project. In each area, data for a number of different indicators are shown for Cyprus, the USA and EU25. The values of EU25 have been chosen as a reference in each indicator. The absolute figures used to calculate the values for the indicators and the sources for the data can be found in Annex 5. In principle, for each indicator, data are presented for three periods. The periods chosen can vary considerably between indicators; Table A.5.1 presents for each indicator the specific years for each period.

This performance data should be treated with caution. An important indicator for scientific performance is the publications data included in the Science Citation Index (SCI). However, the SCI's bias towards English-language journals could distort country comparisons if Cypriot scientists tend to publish in languages not covered by the SCI. Lack of patent data may reflect failure by the national patent system or failure in meeting international standards.

3.2 Performance in creating a knowledge base and supporting the availability of human resources

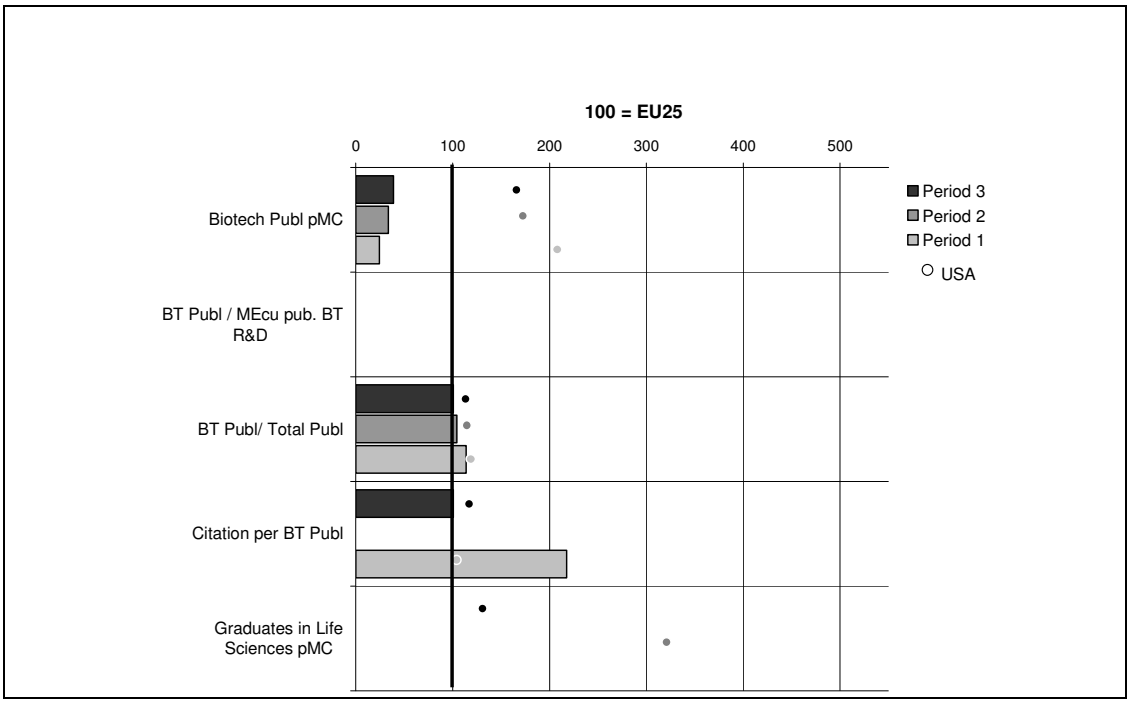
Over a ten-year period, Cyprus steadily increased its output of biotechnology publications per million capita (from index 24 in 1994-1996 to index 39 in 2002-2004 – see Chart 1). However, Cypriot output was modest and far below the EU25 average (index = 100) and USA level (index 166 in 2002-2004). Although the number of Cypriot biotechnology publications was limited, in relation to the total number of publications it remained around the same level as the EU25 average (index 114 in 1994-1996 to index 101 in 2002-2004 for Cyprus), and was only slightly lower than USA figures (index 119 in 1994-1996 to index 113 in 2002-2004).

When considering the number of citations per biotechnology publication, Cyprus (index 218 in 1994-1996 to index 101 in 2002-2004) showed in the first period a much higher performance than the USA (index 104 in 1994-1996 and 117 in 2002-2004) and EU25.

However, Cypriot citation output significantly decreased over the ten-year period and reached a lower level than the USA[1].

In terms of the number of graduates in life sciences per million capita, Cyprus had no output by 2004. This was because the University of Cyprus was relatively new and its first batch of PhD natural science candidates had yet to graduate.

Chart 3.1 Cyprus biotechnology knowledge base indicators: comparison with EU25 and USA figures in three periods (index value)



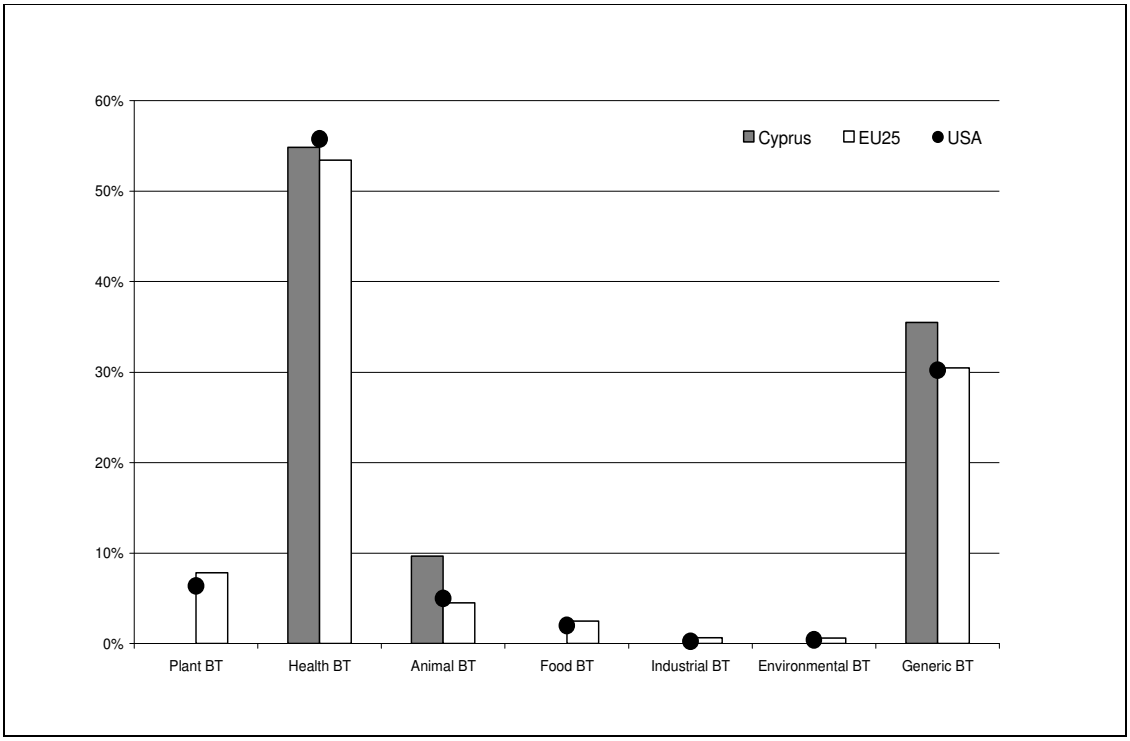
Source: BioPolis Research
Data: Science Citation Index

Cypriot biotechnology publications can especially be found in the fields of human health and generic biotechnology. If we compare figures for the period 1994-1996 and 2002-2004, the picture does not significantly change: the share of human health biotechnology increased from 55% to 63%, while the share of generic biotechnology decreased from

[1] Small countries like Cyprus show a relatively large citation rate. A possible explanation might be that, in terms of number of publications, usually large countries have a larger "middle quality" share of research results (in terms of impacts), leading to a "dilution" of papers with outstanding impact from these countries in a large number of medium-impact publications, while smaller countries have usually "low in the number, but good in quality" publications. This could be explained by a certain concentration of resources in small countries towards selected research groups. In other words, small countries may concentrate their resources in outstanding research units, which would lead to the effect that a lower number of publications may have greater impact. It should be noted, that we did not explore this "small-country" bias in detail during the BioPolis project. Additional research would be required to confirm this explanation.

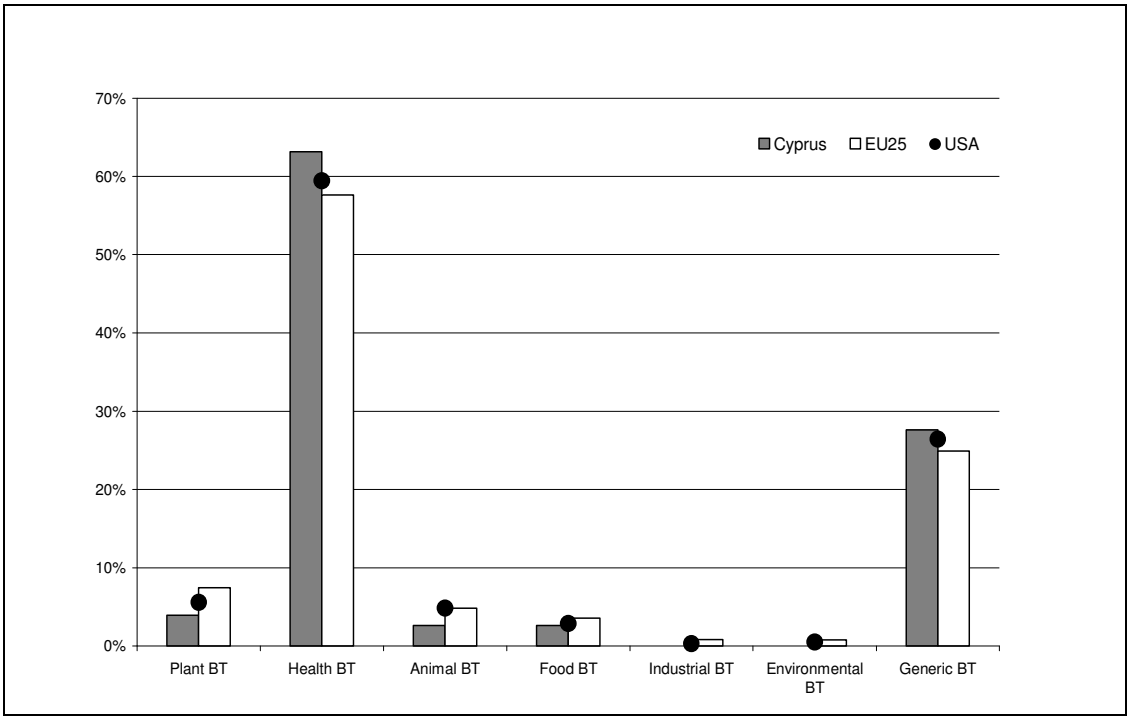
35% to 28%. In terms of how biotechnology publications were spread over various research fields, charts 3.2.1 and 3.2.2 show the breakdown for Cyprus, the USA and EU25 in the periods 1994-1996 and 2002-2004.

Chart 3.2.1 Share of biotechnology subfields, as a percentage of total biotechnology publications: comparison with EU25 and USA figures (1994-1996)



Source: BioPolis Research
Data: Science Citation Index

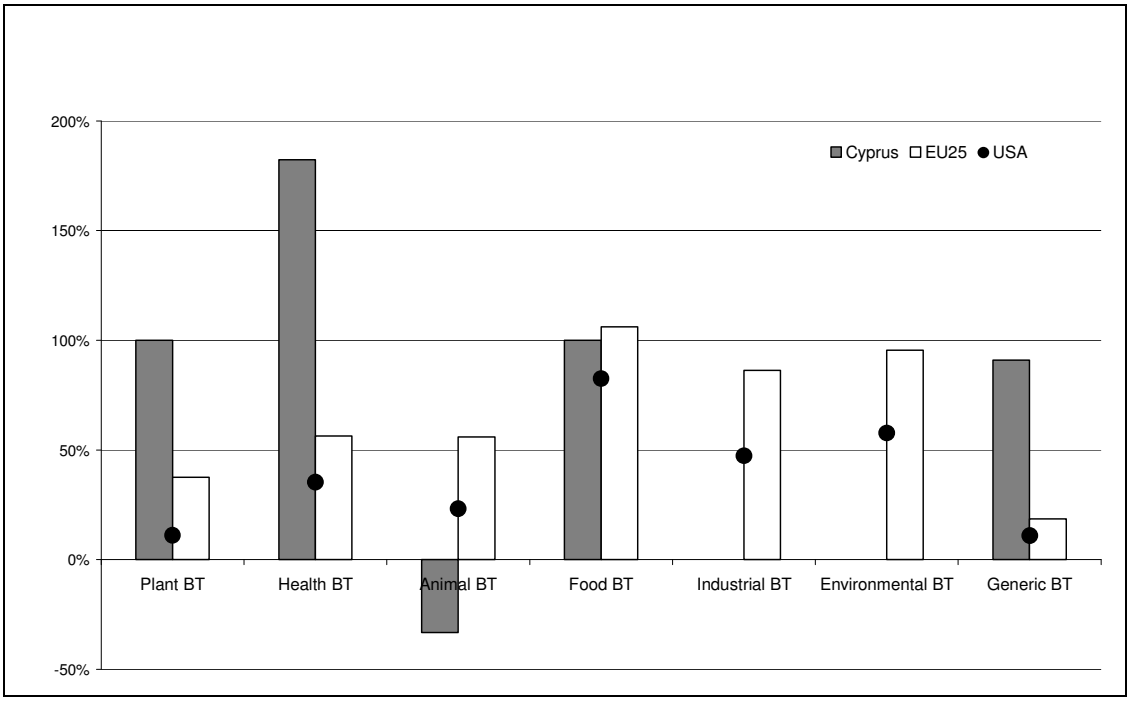
Chart 3.2.2 Share of biotechnology subfields, as a percentage of total biotechnology publications: comparison with EU25 and USA figures (2002-2004)



Source: BioPolis Research
Data: Science Citation Index

With regard to the growth rate of biotechnology publications in the various subfields, those publications dealing with health biotechnology, the largest subfield, increased substantially and far exceeded USA and EU25 levels (see Chart 3.3). The number of human health biotechnology publications in Cyprus increased by 182% between 1994-1996 and 2002-2004. Plant biotechnology (100%), food biotechnology (100%) and generic biotechnology (91%) also showed substantial growth. Due to its relatively low starting base, the Cypriot growth rate in these subfields surpassed EU25 and USA figures, except in the case of food biotechnology where EU25 growth was slight higher than Cyprus'. Cyprus showed zero growth in the environment and industrial biotechnology subfields, and a decrease of 33% in animal biotechnology. By contrast, the USA and EU25 both had substantial publication growth rates in these subfields.

Chart 3.3 Growth rate of biotechnology publications in Cyprus: comparison with EU25 and USA figures (1994-1996 and 2002-2004)

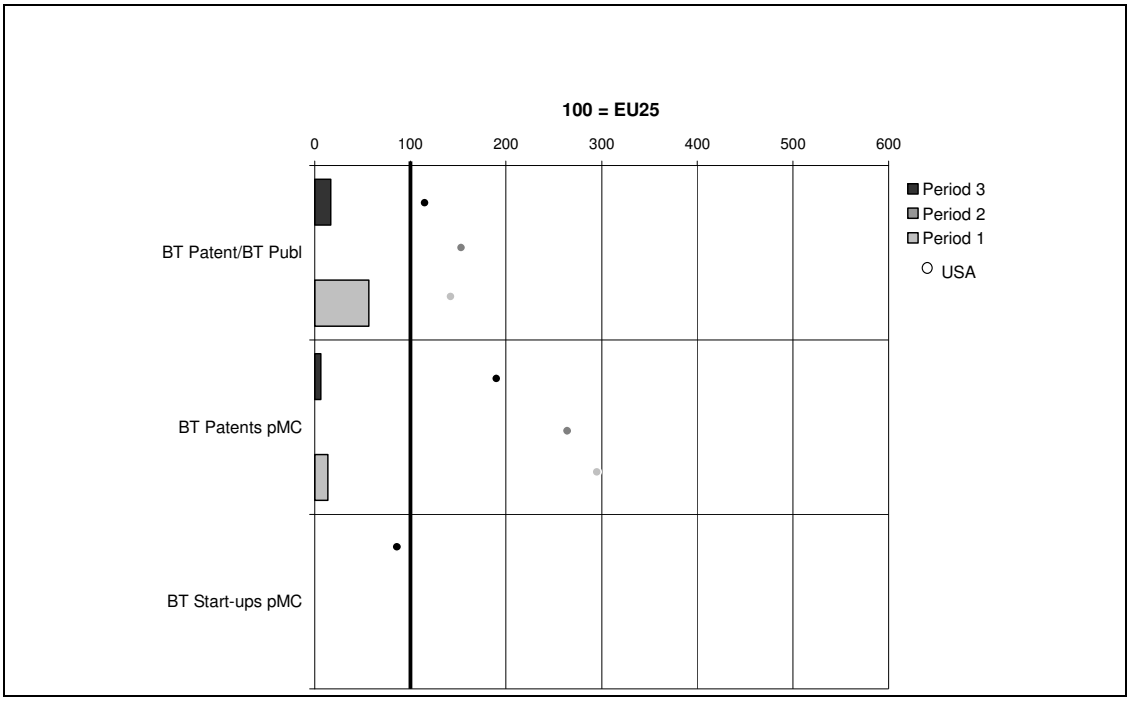


Source: BioPolis Research
Data: Science Citation Index

3.3 Performance in knowledge transmission and application

In terms of biotech patent applications per biotech publications, the output of Cyprus significantly declined in the ten-year period (from index 57 in 1994-1996 to index 17 in 2002-2004). Moreover, Cyprus performed far below EU25 and USA levels (index 142 to index 115 for the same periods). With regard to biotech patents per million capita, Cypriot output likewise declined over the ten years (from index 14 in 1994-1996 to index 6 in 2002-2004), again far below EU and USA levels (index 295 to index 190 for the same periods). In terms of start-ups, there are no data available for Cyprus for this period.

Chart 3.4 Performance indicators for biotechnology knowledge transmission and applications in Cyprus (1994-1996, 1998-2000 and 2002-2004)



Source: BioPolis Research
Data: Science Citation Index

3.4 Industrial development

To date, indicators for industrial development, in terms of the number of biotechnology companies pMC, biotech Initial Public Offerings pMC and venture capital invested in biotechnology companies EUR pC, do not record any achievements for Cyprus.

3.5 Market conditions

Indicators for market conditions measured by the number of field trials and approved biomedicines do not record any achievements for Cyprus.

4. Conclusions

4.1 Introduction

This concluding chapter summarises the information about Cyprus' funding of biotechnology. Since, according to our definition, Cypriot biotechnology is only funded through non-policy-directed funds, the summary only provides an overview of funds for the period 2002-2005.

4.2 Public funding of biotechnology through policy instruments

Although Cyprus has not yet developed a biotechnology programme nor specified biotechnology as a priority area in its R&D and Innovation Policy, a number of biotechnology research projects have been initiated and financed through response mode funding (RPF) and institutional funding (biotechnology research in the CING institute). Table 4.1 shows the funds allocated for each year in the period 2002-2005.

Table 4.1 Public funding of biotechnology through non-directed instruments in the period 2002-2005 (in M EUR)

	2002	2003	2004	2005	Total
RESEARCH					
1. *Non-policy-directed*					
Public research institutions (CING funds)	0.35	0.35	0.35	0.35	1.38
Response mode (RPF)	0.38	0.27	1.52	2.9	5.11
Total	0.73	0.62	1.87	3.25	6.49

5. Future developments

At the time when this report was written, there were no immediate plans regarding the specific funding of biotechnology at national level. However, representatives of MCIT and RPF considered biotechnology a very important sector and expected the government to provide further investment in the future. Biotechnology-related projects would also continue to be funded under the RPF 2006 Programme and future European Framework Programmes.

Annex 1 List of tables

Annex 2 List of figures and charts

Annex 3 List of contact persons

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Bernard Musyck	Frederick Institute of Technology
Elena Ioannidou	Cyprus Institute of Neurology and Genetics
Mona Papadakou	Author Cyprus EU Trend Chart report

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Annex 5 Performance raw data

Introduction

This Annex includes the data that was used to develop the indicators discussed in Chapter 3. Chapter 3 describes four sets of indicators used to measure the performance of the national biotechnology system of innovation, in terms of:

1. Creating a knowledge base and supporting the availability of human resources: Charts 3.1, 3.2.1, 3.2.2 and 3.3
2. Knowledge transmission and application: Chart 3.4
3. Industrial development: Chart 3.5
4. Market conditions: Chart 3.6

The indicators aim to capture trends in performance and compare the national situation with that of a reference region. To present trends in performance, most indicators are provided for three or two different time periods, depending on data availability. To avoid capturing erratic trends, each time period includes several years, again depending on data availability. Information on which years have been captured for each period and comments concerning the index used can be found in the last two columns of Table A5.1.

Table A5.1. Performance indicators, charts, comments and time periods

	Indicator	Chart	Comments	Time periods
Ind. 1	Biotech publications per million capita (pMC)	3.1	Index: Reference Region EU25 =100 and US data for comparison	(1) 1994-1996, (2) 1998-2000, (3) 2002-2004
Ind. 2	Biotech publications per BT public R&D expenditure	3.1	Only for those countries included in the inventory Index: Reference Region EU25 =100	BT Pub. 2002-2004 / Total Pub. Expenditure 1994-1998 M Ecu
Ind. 3	BT patents / BT publications	3.4	Index: Reference Region EU25 =100 and US data for comparison	(1) 1994-1996 (2) 1998-2000 (3) 2001-2003
Ind. 4	BT publications / Total pub.	3.1	Index: Reference Region EU25 =100 and US data for comparison	(1) 1994-1996 (2) 1998-2000 (3) 2002-2004
Ind. 5	Citations to BT publications	3.1	Index: Reference Region EU25 =100 and US data for comparison Small country effect	(1) 1994-1998 (3) 2000-2004

	Indicator	Chart	Comments	Time periods
Ind. 6	Graduates in life sciences pMC	3.1	Index: Reference Region EU17 =100 and US data for comparison	(2) 1998 (3) 2002
Ind. 7	BT publications in subfields, as % of total BT publications	3.2.1	Data in % EU25 and US data for comparison	1994-1996
		3.2.2		2002-2004
Ind. 8	Growth rate of BT publications in subfields	3.3	EU25 and US data for comparison Small field effect	Growth rate between 1994-96 (period 1) and 2002-04 (period 3)
Ind. 9	Biotech patent applications pMC	3.4	EU25 and US data for comparison	(1) 1994-1996 (2) 1998-2000 (3) 2001-2003
Ind. 10	Number of biotechnology companies pMC	3.5	European (data available) and US data for comparison	(2) 2001 (3) 2004
Ind. 11	Number of biotech start-ups pMC	3.4	European (data available) and US data for comparison	(3) 2001-2003 (only one period)
Ind. 12	Number of biotech IPOs pMC	3.5	European (data available) and US data for comparison	(3) 2002-2005
Ind. 13	Venture capital in € pC	3.5	European (data available) and US data for comparison	(2) 2002 (3) 2004
Ind. 14	BT acceptance index	No Chart - Discussed in text of chapter 3	Source: BT Policy Benchmarking 2005. The biotechnology acceptance index is a composite index and draws on questions Q.12, Q.13.1 and Q14.01 and Q14.09 of the Eurobarometer 58.0	2002
Ind. 15	Eurobarometer 225	No Chart - discussed in text of chapter 3	See section 3.3 and sections 3.4.1, 3.4.2, and 3.4.3 of the Special Eurobarometer 225[2]	2005
Ind. 16	Biomedicines	3.6	Source: BT Policy Benchmarking 2005 Index: Reference Region EU15 =100 US data for	1995-2002

[2] http://europa.eu.int/comm/public_opinion/archives/ebs/ebs_225_report_en.pdf

	Indicator	Chart	Comments	Time periods
			comparison	
Ind. 17	Field trials	3.6	Source: Biotechnology Innovation Scoreboard 2002 Index: Reference Region EU15 =100 US data for comparison	1996-2001

The following methodological issues are related to some of the indicators:

- Indicator 3 (Patent BT / Publications BT) replaces the indicator *BT publications basic research/ BT publications applied research*. Results of the EPOHITE project have shown that the original indicator does not differ significantly in the case of old EU member states. This might be the result of methodological problems associated with the indicator, since the definition of basic and applied research is based on a journal classification made by SCI. The explanatory power of this indicator is therefore questionable.
- To calculate the citation rate first the publications for the period 1994-1996 (set 1) were searched and all the publications in 1994-1998 that cited any publications in set 1 (set 2). Citation rate has been calculated by (number of publications in set 2) / (number of publications in set 1). However, many of the articles in set 2 cited not only one article in set 1 and these duplicated citations are not taken into account in our calculation. For example, if there are 2 articles in set 1 and they each has one citation but cited by the same article, there is only 1 article in set 2. The citation rate for the 2 articles in set 1 is 0.5 instead of 1. This depreciation is more obvious in countries with more publications such as USA and EU25 since the possibility to cite multiple articles in set 1 is large. Accordingly the citation rates of USA and EU25 are a bit underestimated.
- The indicator 'Citations to BT publications' seems to have a 'small country effect' bias. Small countries show a relatively large citation rate. A possible explanation might be that, as far as number of publications is concerned, larger countries usually have a larger 'middle quality' share of research results (in terms of impact) while smaller countries usually have a 'low in number but good in quality' publications impact. This can be explained by the concentration of resources allocated to selected research groups in small countries. Small countries may concentrate resources in outstanding research units. Accordingly, fewer publications may have greater impact.
- The EU25=100 index is applicable in the indicator 'Graduates in life sciences pMC' since data was only available for 17 member states.
- For those countries starting from zero in period 1 (1994/1996), the growth rate of BT publications in subfields was set to 100% if the number of publications in period 3 (2002-2004) was larger than zero. On the other hand, if the country reduced the number of publications to zero in the period 2002-2004, the growth rate was -100%.Given that a relative growth rate was used, small fields tended to

have relatively larger growth rates.

- To benchmark each country we chose EU25 (or EU15 if data was not fully available) as the reference region. In those cases where data for EU25 or EU15 were not available, the reference corresponds to the sum of national data available. Moreover, to ease the presentation of indicators with different scales in a given chart, an index value was used.

Raw data for Charts in chapter 3

Raw data for Chart 3.1. BT publications per million capita (pMC): absolute and indexed values

	BT publications			Population (million)		
	94-96	**98-00**	**02-04**	**1996**	**2000**	**2004**
EU25	97521	128716	145646	447	451	457
Cyprus	35	66	91	1	1	1
USA	119802	135508	154402	264	276	292
	BT publications/pMC			**Index EU25=100**		
	94-96	**98-00**	**02-04**	**94-96**	**98-00**	**02-04**
EU25	218	285	319	100	100	100
Cyprus	53	96	125	24	33	39
USA	454	492	529	208	172	166

Source: BioPolis Research
Publications: SCI
Population: EUROSTAT and OECD

Raw data for Chart 3.1. BT publications per BT public R&D expenditure

	BT publi-cations	**Non-policy-directed funding**	**Policy-directed funding**		**Total public spending on BT (Mecu)**	**BT publications/ Mecu BT public expenditure**	**Index**
			Biotech specific	**Generic**			
	2002-2004	**1994-1998**	**1994-1998**	**1994-1998**	**1994-1998**	**2002-2004/ 1994-1998**	
EU25	145646				n.a.		
Cyprus	91				n.a.		n.a.
USA	154402				n.a.		n.a.

Source: BioPolis Research
Publications: SCI
BT public expenditures in research: Inventory Project, Table 3.4 Executive Summary
n.a.: no data available

Raw data for Chart 3.1. BT publications, as share of total publications: absolute and indexed values

	BT publications			Total publications		
	94-96	**98-00**	**02-04**	**94-96**	**98-00**	**02-04**
EU25	97521	128716	145646	860652	1024327	1117392
Cyprus	35	66	91	271	504	694
USA	119802	135508	154402	889506	941191	1045894
	Share of BT publications			**Index EU25=100**		
	94-96	**98-00**	**02-04**	**94-96**	**98-00**	**02-04**
EU25	11%	13%	13%	100	100	100
Cyprus	13%	13%	13%	114	104	101
USA	13%	14%	15%	119	115	113

Source: BioPolis Research
Publications: SCI

Raw data for Chart 3.1. Citations to BT publications: absolute and indexed values

	Citations to BT publications		Index EU25=100	
	94-98	**00-04**	**94-98**	**00-04**
EU25	6.14	7.28	100	100
Cyprus	13.37	7.33	218	101
USA	6.39	8.54	104	117

Source: BioPolis Research
Data Citation: SCI

Raw data for Chart 3.1. Graduates in life sciences pMC: absolute and indexed values

	Graduates in Life Sciences		Population (million)	
	1998 / 1999	**2002**	**1998 / 1999**	**2002**
EU17	46859**	81316	552**	431
Cyprus	n.a.	n.a.	1*	1
USA	75253*	70950	276*	288
	Graduates pMC		**Index EU17=100**	
	1998 / 1999	**2002**	**1998**	**2002**
EU17	91**	189	100	100
Cyprus	n.a.	n.a.	n.a.	n.a.
USA	273*	246	321	131

* data for 1998; ** data for 1999
Index EU17=100 for 1998 is EU-16, because for Portugal no data availiable
Source: BioPolis Research
Population source for US OECD
OECD Education Database

Raw data for Chart 3.2.1. BT publications in subfields, as share of total BT publications, for the period 1994-1996

	1994-1996							
	Total	**Plant**	**Health**	**Animal**	**Food**	**Indus-trial**	**Environ-mental**	**Generic**
EU25	100%	8%	53%	5%	3%	1%	1%	30%
Cyprus	100%	0%	55%	10%	0%	0%	0%	35%
USA	100%	6%	56%	5%	2%	0%	0%	30%

Source: BioPolis Research
Publications: SCI

Raw data for Chart 3.2.2. BT publications in subfields, as share of BT publications, for the period 2002-2004

	2002-2004							
	Total	**Plant**	**Health**	**Animal**	**Food**	**Indus-trial**	**Environ-mental**	**Generic**
EU25	100%	7%	58%	5%	4%	1%	1%	25%
Cyprus	100%	4%	63%	3%	3%	0%	0%	28%
USA	100%	6%	59%	5%	3%	0%	1%	26%

Source: BioPolis Research
Publications: SCI

Raw data for Chart 3.2.1 BT publications in subfields for the period 1994-1996

	1994-1996							
	Total	**Plant**	**Health**	**Animal**	**Food**	**Indus-trial**	**Environ-mental**	**Generic**
EU25	97217	7629	51944	4375	2434	624	576	29635
Cyprus	31	0	17	3	0	0	0	11
USA	111686	7118	62274	5580	2230	296	459	33729

Source: BioPolis Research
Publications: SCI

Raw data for Chart 3.2.2 BT publications in subfields for the period 2002-2004

	2002-2004							
	Total	**Plant**	**Health**	**Animal**	**Food**	**Indus-trial**	**Environ-mental**	**Generic**
EU25	140984	10494	81220	6821	5017	1162	1126	35144
Cyprus	76	3	48	2	2	0	0	21
USA	141680	7910	84234	6872	4070	436	724	37434

Source: BioPolis Research
Publications: SCI

Raw data for Chart 3.3. Growth rate of BT publications in subfields between 1994-96 and 2002-04

	1994-1996/2002-2004						
	Plant	**Health**	**Animal**	**Food**	**Industrial**	**Environ-mental**	**Generic**
EU25	38%	56%	56%	106%	86%	95%	19%
Cyprus	100%	182%	-33%	100%	0%	0%	91%
USA	11%	35%	23%	83%	47%	58%	11%

Note: For those countries starting from 0 in period 94/96, the growth rate was set to 100% no matter how large the number in period 2002/2004 is. On the other hand, if the country reduces the number of publications to 0 in period 2002/2004, the growth rate is -100%.
Source: BioPolis Research
Publications: SCI

Raw data for Chart 3.4. BT Patents pMC: absolute and indexed values

	BT patents			**Population (million)**		
	94-96	**98-00**	**01-03**	**1996**	**2000**	**2003**
EU25	4924	8921	10119	447	451	455
Cyprus	1	0	1	1	1	1
USA	8590	14396	12348	264	276	292*
	BT patents/pMC			**Index**		
	94-96	**98-00**	**01-03**	**94-96**	**98-00**	**01-03**
EU25	11	20	22	100	100	100
Cyprus	2	0	1	14	0	6
USA	33	52	42	295	264	190

Source: BioPolis Research
Publications: SCI
Patents: Questel Orbit

Raw data for Chart 3.4. BT patents per BT publications: absolute and indexed values

	BT patents			**BT publications**		
	94-96	**98-00**	**01-03**	**94-96**	**98-00**	**01-03**
EU25	4924	8921	10119	97521	128716	140219
Cyprus	1	0	1	35	66	83
USA	8590	14396	12348	119802	135508	148853
	BT patents/ BT publications			**Index EU25=100**		
	94-96	**98-00**	**01-03**	**94-96**	**98-00**	**01-03**
EU25	0.05	0.07	0.07	100	100	100
Cyprus	0.03	0.00	0.01	57	0	17
USA	0.07	0.11	0.08	142	153	115

Source: BioPolis Research
Publications SCI
Patents Questel Orbit

Raw data for Chart 3.5. Number of BT companies pMC for the period 2001 – 2004: absolute and indexed values

	BT companies				Population in T			
	2001	**2002**	**2003**	**2004**	**2001**	**2002**	**2003**	**2004**
Europe	1879	1878	1861	1815	452016	452641	454580	456863
EU Available	1643	1650	1782	1605	319337	319484	408602	322210
Cyprus	n.a.	n.a.	n.a.	n.a.				
USA	1457	1472	1473	1444	285102	287941	290789	291685
	BT companies pMC				**Index**			
	2001	**2002**	**2003**	**2004**	**2001**	**2002**	**2003**	**2004**
Europe								
EU Available	5	5	4	5	100	100	100	100
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
USA	5.11	5.11	5.07	4.95	99	99	116	99

Note: EU Available is the result of the sum of available EU member states
Source: BioPolis Research
Biotech companies: E&Y Beyond Border 2002, 2003, 2004, 2005, EuropaBio

Raw data for Chart 3.5. BT start-ups pMC for the period 2001-2003 and year 2003: absolute and indexed values

	BT Start-ups		Population in T	
	2001-2003	**2003**	**2003**	
Europe (EU 15 - Cyprus - Greece + Norway + Switzerland)	523	132	367051	
Cyprus	n.a.	n.a.		
USA	355	83	290789	
	Biotech start-up/pMC	**Index**	**Biotech start-up/pMC**	**Index**
	2001-2003	**2001-2003**	**2003**	**2003**
Europe (EU 15 - Cyprus - Greece + Norway + Switzerland)	1.4	100	0.36	100
Cyprus	n.a.	n.a.	n.a.	n.a.
USA	1.2	86	0.29	79

Source: BioPolis Research
Start-ups: EuropaBio

Raw data for Chart 3.5. Number of BT IPO's pMC: absolute and indexed values

	BT IPO	Population T				
	2002-2005	2002	2003	2004	2005	2002-2005
EU Availiable	29	452927	454869	457154	461593	456636
Cyprus	0	706	715	730	749	725
USA	52	287941	290789	291685		290138

	IPO /pMC	Index
	2002-2005	2002-2005
EU Availiable	0.00	100
Cyprus	0.00	0
USA	0.00	282

Note: EU Available is the result of the sum of available EU member states
Source: BioPolis Research
IPO data: Ernst and Young 2002-2005, London Stock Exchange, Frankfurt Stock Exchange, Euronext, Nasdaq, Burril & Company

Raw data for Chart 3.5. Venture capital pC: absolute and indexed values

	Venture Capital in Biotechnology companies M€			Population in T		
	2002	2002	2002	2002	2003	2004
Europe	1100	920	2800			
EU Availiable	890	883	1111	315584	319663	325131
Cyprus	n.a.	n.a.	n.a.			
USA	2288	2498	2855	287941	290789	291685
	Venture Capital in €/pC			Index		
	2002	2003	2004	2002	2003	2004
Europe						
EU Availiable	2.8	2.8	3.4	100	100	100
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
USA	8	9	10	282	311	286

Source: BioPolis Research
VC data: E&Y Beyond Borders 2002, 2003, 2004, 2005

Raw data for Chart 3.6. Number of Biomedicines pMC

	Biomedicines	Population (Million)	Biomedicines / pMC	Index
	1995-2002	2002		1995-2002
EU15	39	378	0.10	100
Cyprus	n.a.	n.a.	n.a.	n.a
USA	115	289	0.40	387

Note: EU 15 is the result of the sum of the 15 old EU member states
Source: BioPolis Research
Number of biomedicines: Benchmarking of public biotechnology policy 2005

Raw data for Chart 3.6. Number of field trials pMC

	Field Trials	Population in M	Field Trials pMC	Index
	1996-2001	2001	1996-2001	1996-2001
EU15	1334	379	4	100
Cyprus	n.a.	n.a.	n.a.	n.a.
USA	6745	278	24	688

Note: EU 15 is the result of the sum of the 15 old EU member states
Source: BioPolis Research
Filed trials: Biotechnology Innovation Scoreboard 2002

Raw data for biotechnology acceptance. Data are mentioned in the text of Chapter 3.

BT Acceptance Index 2002		
	Index Average	N (sample size)
EU - 15*	100.29	16828
Cyprus	n.a.	n.a.

*Weighted Average according to the weight 'W13' of the Eurobarometer 58.2, which considers population differences among countries and corrects for inconsistencies in the national samples
Source: BioPolis Research
BT acceptance index: Benchmarking of public biotechnology policy 2005

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Burril & Company: http://www.burrillandco.com/

EuropaBio: http://www.europabio.org/

EUROSTAT: http://epp.eurostat.cec.eu.int/

OECD Education Database: http://www.oecd.org/

OECD Statistics: http://www.oecd.org/

STN International: http://www.stn-international.de/

Questel Orbit: http://www.questel.orbit.com/index.htm

Annex 6 Abbreviations

ARI	Agriculture Research Institute
CIT	Cyprus Institute of Technology
GMM	Genetically Modified Micro-organisms
INTAS	International Association for the Promotion of Cooperation with Scientists from the New Independent States of the Former Soviet Union
IRC	Innovation Relay Centre
JRC	Joint Research Centre
MCIT	Ministry of Commerce, Industry and Tourism
RPF	Research Promotion Foundation
SGL	State General Laboratory