

Greece

Presentations by Drs Tzotzos and Dourtoglou

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1.5. GREECE

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Presentation by George Tzotzos

INTRODUCTION

Greece's economy has several similarities with that of Latin America. Emphasis is placed on services and traditional agri-industries, while Greece's chemical industry was heavy commodity and obsolescent; unable to incorporate biotechnological advances.

In Greece as a whole the worldwide trend, of movement away from manufacturing to service industries, is being observed. The Greek scientific community has two components, a small domestic element and a large and conspicuously successful international element.

To encourage the development of an infrastructure capable of supporting a Greek biotechnology industry the government launched incentives for the repatriation of Greek scientists. These took the form of two international centres of excellence

- The Institute of Molecular Biology and Biotechnology, IMBB, at Heraklion, Crete and:
- The Hellenic Institute Pasteur launched a hybridoma and monoclonal antibody facility.

Participation of Greek scientists and laboratories in European and EEC ventures such as EMBL/EMBO and the BEP and BAP programmes has increased the flow of knowledge and awareness in biotechnology.

With the support of the government the first Greek biotechnology company, Biohellas, has recently been launched.

These measures have provided a solid basis for encouraging the repatriation of Greek scientists working overseas.

WHAT EXPERIENCE HAS BEEN GAINED IN THE PAST FOUR YEARS?

1. Finance, management and marketing are integral parts of the biotechnology process. Small economies cannot meet demand for these skills at an adequate level.
2. R&D scale-up is investment intensive, making redundant the notion that biotechnology is cheap.
3. Expertise in microbial physiology and fermentation is embryonic in Greece and probably elsewhere too. Training in biochemical sciences is no panacea.

In the light of the above it appears unlikely that transfer of technology and strengthening of the biotechnology industry can be achieved without a coherent policy focusing on target definition, commitment of resources and openness to the scientific and entrepreneurial communities beyond national borders. The latter is of paramount importance particularly in cases where national economies are unable to sustain technological growth at the required pace. Greece's efforts to overcome the problems, briefly outlined above, is presented in Dr Dourtoglou's paper.

Presentation by Dr V. Dourtoglou

Greece has come to appreciate the potential of modern biotechnological innovations. Interest in government circles was first stimulated at the beginning of the 1980s, when a national support policy for both private and public sector involvement in biotechnology was outlined.

Of primordial importance in assisting Greek biotechnological development is the provision of training. In the medium term such training should be geared to industrially relevant aspects of biotechnology such as:

- enzyme engineering;
- bioreactor use and development;
- diagnostic kit development;
- agricultural biotechnology, micropropagation etc.

With no advanced industrial base available to assist the development of biotechnology and no suitable funding structures in Greek financial markets, it must be assumed that only by 1994 will Greek biotechnology enter a

positive cash-flow situation. The role of state intervention is therefore critical to the development of a domestic biotechnology enterprise.

ROLE OF THE STATE

A number of ministries have interests in biotechnology and the following all have a budgetary allocation for biotechnology.

- Ministry of Energy, Industry and Technology, General Secretariat for Research and Technology;
- Agricultural Ministry;
- Health and Social Security Ministry;
- Ministry of Environment and Urban Planning;
- Ministry of the National Economy.

As yet there is no formal interministerial co-ordination, but the Research and Technology Secretariat has drawn up a plan which considers other ministries and research interests in biotechnology.

The Research and Technology Secretariat may gain the authority to steer national biotechnology policy with the approval of all ministries.

Three laboratories in Greece can be considered to have significant resources in biotechnology. These are:

- IMBB Heraklion
- Centre for Biological Research of the National Research Foundation
- Hellenic Institute Pasteur, Athens

Since 1979, university research work has received government backing, but as explained elsewhere, Greek universities are viewed primarily as training, not research, establishments.

Despite the identification of biotechnology as a national priority, the production capacity of existing related industry has limited both project development and proposals.

With the support of the government, two investment banks and the Pharmaceutical Producers Association of Greece launched the first Greek biotechnology company, Biohellas, in 1984. Today two companies in Greece have a significant biotechnology commitment, the second being Vioryl.

Having manifest the industrial application of biotechnology as a priority, the government passed legislation to aid investment in advanced technology. Guidance was given to universities and secondary education so as to achieve an output of graduates able to support commitment to high technology. The universities have responded by organising training programmes in rDNA and other aspects of biotechnology.

With 20% of the national workforce in agriculture, it was logical to place emphasis on agro-biotechnology, including the support of small companies active in micropropagation and biomass. Other areas include waste treatment and diagnostics of agricultural relevance.

To obtain a redeployment of skills, retraining and reorientation towards high technology is perceived to be of importance.

FINANCING BIOTECHNOLOGY

A rapidly growing slice of the total R&D budget of 15.56 billion drachma is being spent on biotechnology.

Year	Dr Millions
1984	160
1985	358
1986	638

A relatively large percentage of biotechnology spending is being devoted to agricultural applications, centred on a number of sites and institutes.

Healthcare biotechnology is an important area and relevant research is focused on the IMBB and the Hellenic Institute Pasteur. It is still too early to see the consequences of spending in health care and agriculture. In industry the first concrete manifestation of progress is Biohellas, but here too many projects are in development rather than commercial exploitation. Biohellas has a privileged relationship with IMBB, with a licence to commercialise IMBB developed innovations.

Vioryl is more independent of government support and has successfully commercialised pheromone technology. It is now trying to master monoclonal antibody production. Other interests include biocatalysis.

A number of small firms are commercialising agricultural aspects of biotechnology, *in vitro* technology and micropropagation. The Ministry of agriculture should be approached for information on these firms.

EEC support is helping both industrial and academic laboratories to build fruitful relationships with other biotechnology laboratories operating in the EEC. These ventures will make a large contribution to the Greek knowledge base in precompetitive research relevant to biotechnology industry.

There is, in conclusion, much in the Greek experience of biotechnology that could be of direct relevance to developing countries interested in the possible benefits of biotechnology based industrial ventures.