

Dénes DUDITS\*

## THE INTEGRATION OF LIFE-SCIENCE BASIC RESEARCH INTO THE INNOVATION CHAIN: POTENTIALS AND LIMITATIONS\*\*

**Abstract:** In the genomic era life sciences undergo both conceptual and methodological revolution with direct influence on the development of the bio-industry and the handling of global environmental issues including food security and safety. The South Hungarian region with the city of Szeged provides a good example for actual attempts in establishing a link between internationally recognized basic life sciences and the creation of the biotechnology based industry. The four institutes of the Szeged Biological Research Centre of the Hungarian Academy of Sciences with the faculties of Medical and Natural Sciences at the University of Szeged represent a high concentration of research activities in wide range of fields of life sciences.

Presently the scientific community has preferential interest in publication and lacks the tradition of using efficient technology transfer mechanisms. Firstly successes have been achieved in foundation of spin-off biotechnological companies. The small size and limitation in capital restrict the survival rate of these companies. Therefore the presence of pharmaceutical industry is an essential requirement for the stabilisation of the regional development. Considering the tradition in the plant breeding and the seed industry the plant molecular biology research has a key role in providing new methodology primarily based on gene technology for crop improvement.

Seeing the present trends in technology transfer it is evident that without national R + D policy and governmental or regional priorities there is no chance to reach the European standard at regional level in Hungary and in other new member states.

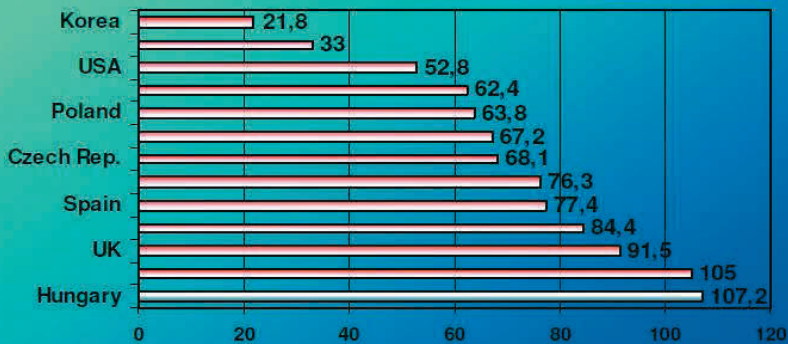
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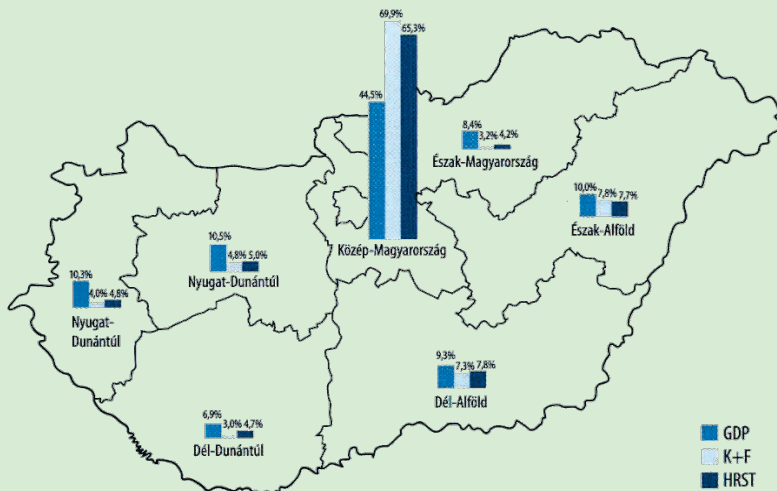
\*\* The paper is given in terms of PowerPoint presentation.

## High scientific productivity with low financial support

Number of publications per 1 M USD R&D expenditure in universities and research institutes  
(source: NSIOD, Institute for Scientific Information)



## Unbalanced regional contribution to national GDP, research-development and human resources



Resource: OECD-NKTH 2009

## Major Players in Biotechnology of the South Plain Region in Hungary



Szeged University



Biology Research Center



Biotechnology Institute  
of Bay Zoltan foundation



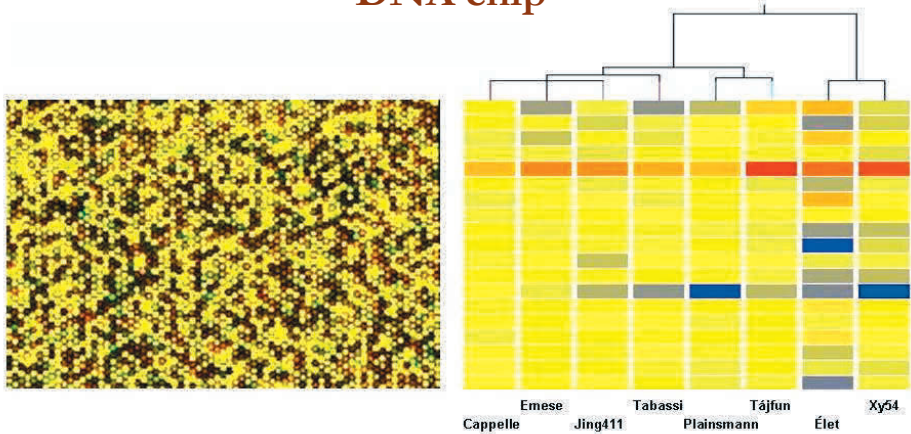
Cereal Research Company

## Revolution in DNA sequence technology

Applied Biosystems SOLiD™ 3 System

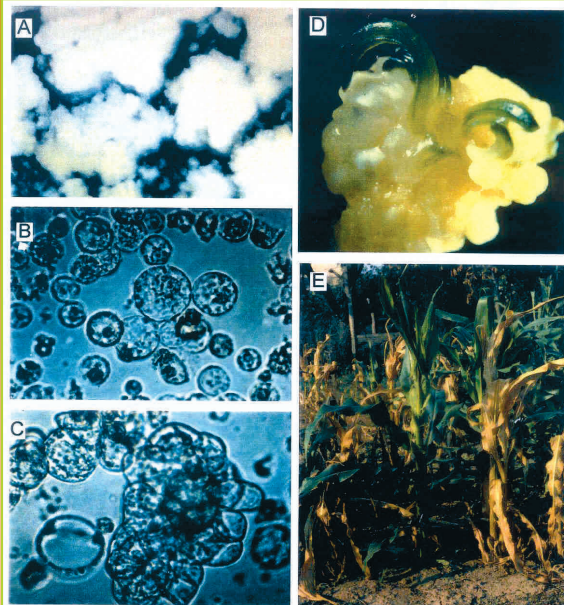


## Genome wide gene expression analysis with DNA chip



Gene expression profiles in drought stressed wheat roots

## Production of transgenic (GM) plants as research and breeding tools



## The Pharmaceutical industry traditionally strong in Hungary except in the South Plain Region

Vast presence of large international pharmaceutical and biotechnology firms

- Early and late stage R&D as well as manufacturing
- Not only sales and marketing

National pharmaceutical industry with strong historical roots:

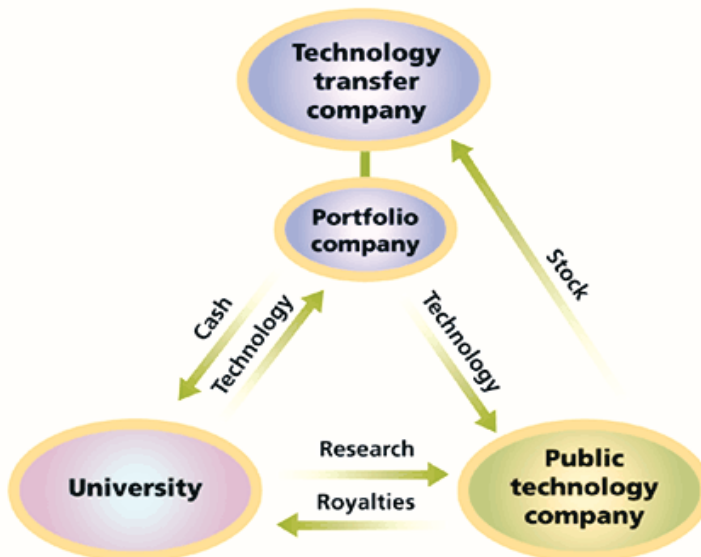
Founded in	Renamed after WWII	Now partially owned by
1901 Gedeon Richter	Chinoin	Sanofi-Aventis
1910 Alka	Biogal	TEVA
1912 Rex	Human-Phylaxia	TEVA
1912 Phylaxia	Egis	Servier
1913 Dr. Wander		ICN
1927 Alkaloida		

Gedeon Richter alone employs over 700 R&D staff.

All foreign owners have invested heavily in Hungarian subsidiaries' R&D and manufacturing



## General model for technology transfer pathways





The top section of the slide features a logo on the left and a photograph on the right. The logo, titled "BIOPOLISZ SZEGED", is set against a white background with a blue arch above it. Inside the arch are four vertical bars labeled "A-T", "C-G", "A-T", and "C-G". Below the main text are blue wavy lines. The photograph on the right shows a large, multi-story building with a central tower and a spherical sculpture in the foreground, all under a purple and blue sky.

**BIOPOLISZ Innovation and Service Ltd. Szeged**

## Plan for a Life Science SME Incubator House in Szeged





## Main Parameters for the South Plain Region

Number of invention disclosures	115
Number of patent applications	61
Number of licenses	7
Number of spin-offs generated	15



## Innovation resources

The majority of the respondent (about three-quarters) innovation enterprises utilize intellectual property in their products, services and technologies

The enterprises primarily target domestic and European markets in terms of protection

According to the majority of enterprises, the competitiveness is based on the added value of their intellectual property

The size of the patent portfolio per enterprise is not considered significant



## Innovation resources

The potential of the most significant intellectual properties at the region's research centers is not economically exploited

A significant number of the respondent researchers (23,1 %) fully rejects the intellectual property protection in order to disseminate research results as widely as possible (this is not a regional specificity)

According to many researchers (47.8%), the intellectual property protection has no positive impact either on the publishing activity or on the progress of his career



## Innovation support

Nearly half of the respondent enterprises have already ordered research from public-funded research institutes

Nearly half of the respondent enterprises have already collaborated with public-funded research institutes in joint innovation projects

The majority of the respondent researchers would rather not participate in research utilizing companies as owner but prefer licensing (lack of entrepreneurship/lack of business skills, risk aversion).

One of the main motivating factor of the researchers to collaborate with the enterprises is to gain financial benefits.





## Analysis of Prior Art

Number of Prior Art researches taken per year

Year	Number of Prior Arts
2005.	15
2006.	9
2007.	33
2008.	13
2009.	12
Total	82

Goal: to get a realistic picture of the expected outcome of patenting before undertaking patenting costs.



## Analysis of Prior Arts

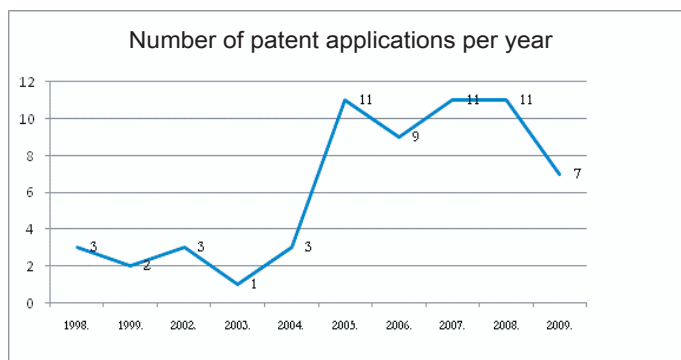
The majority of the inventions disclosed by the researchers can be novel in the light of the state of art.

The inventors really created some kind of a technical novum and not just thought they did

However, inventive step is quite often questionable!



## Evaluation of documents required for industrial property protection



The research used a database that contains industrial property data of 61 regional academic patent applications. The number of patent applications between 2005 and 2008 was 9-11 / year.



## Distribution of the Spin-off companies in terms of scientific disciplines

Scientific disciplines	Ratio of Spin-off companies	Number of Spin-off companies
Biology	33,33%	5
Physics	26,67%	4
Mechanics	6,67%	1
Pharmacology	13,33%	2
IT	6,67%	1
Medicine	6,67%	1
Electrical engineering	6,67%	1
Total	100,00%	15

According to the classification of the main disciplines most spin-off companies deal with biological sciences.



## Conclusions and recommendations II.

Without innovation services the region's research and research utilizing members fall behind in the IP utilizing competition

A change in the researchers' attitude and their open mind to new services are also required

The service providers need to rely on the the new and efficient IT based solutions.



## Conclusions and recommendations I.

The spin-off companies are not the only drivers of a knowledge region

Those spin-off companies that are prepared for intellectual property utilization are not capable to generate economic development on their own

The spin-off companies are only capable of functioning if a potential business utilization is at least within sight

