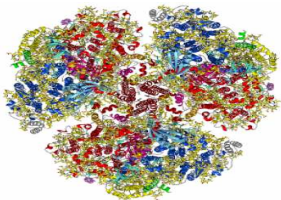


Pharma Industry & ESS

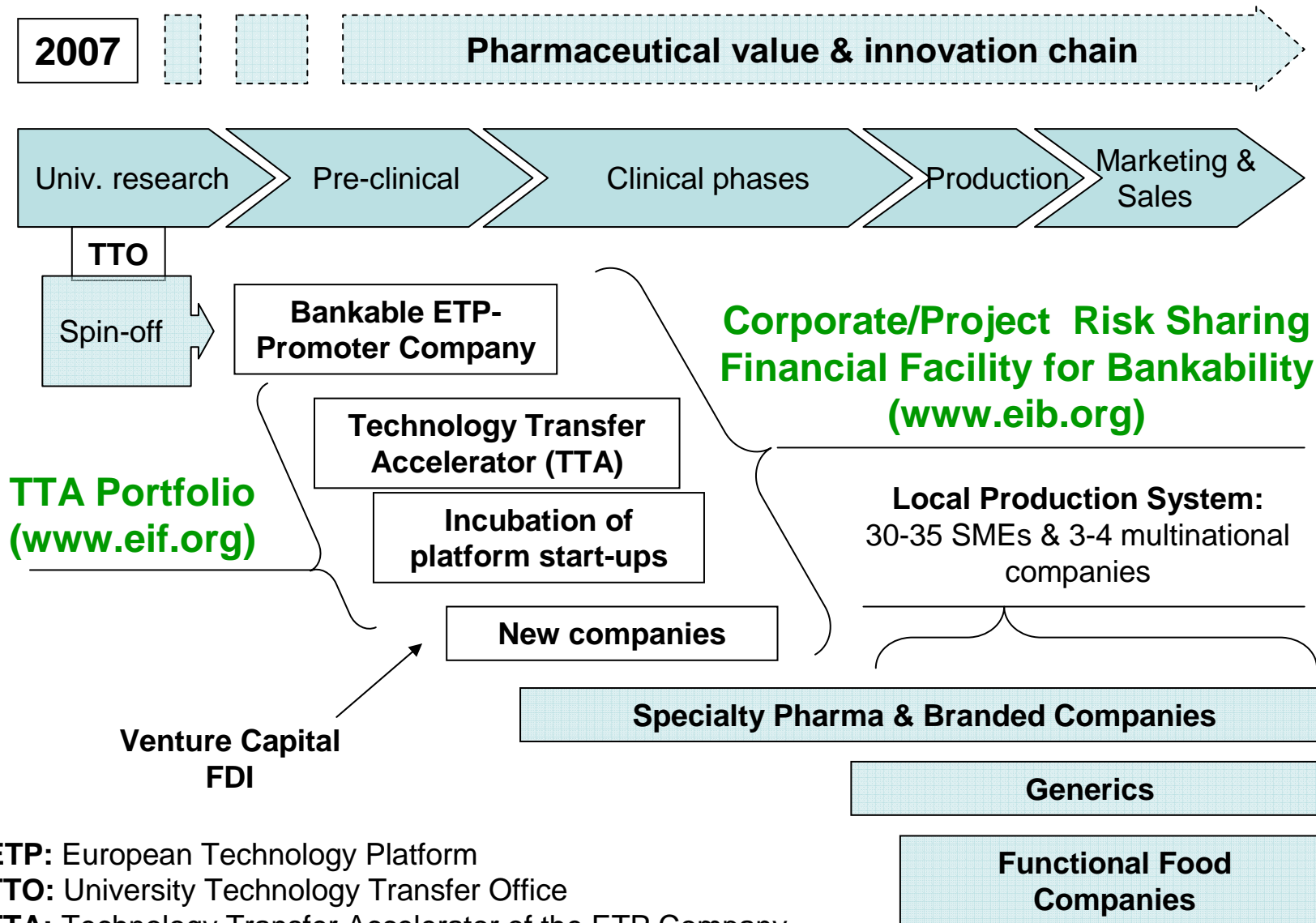
(Pharmapolis: az ESS jövőbeni pharmainnovációs környezete)

Csaba Pankucsi

Pharmapolis Cluster Ltd.
Debrecen



Pharmapolis Platform & Cluster

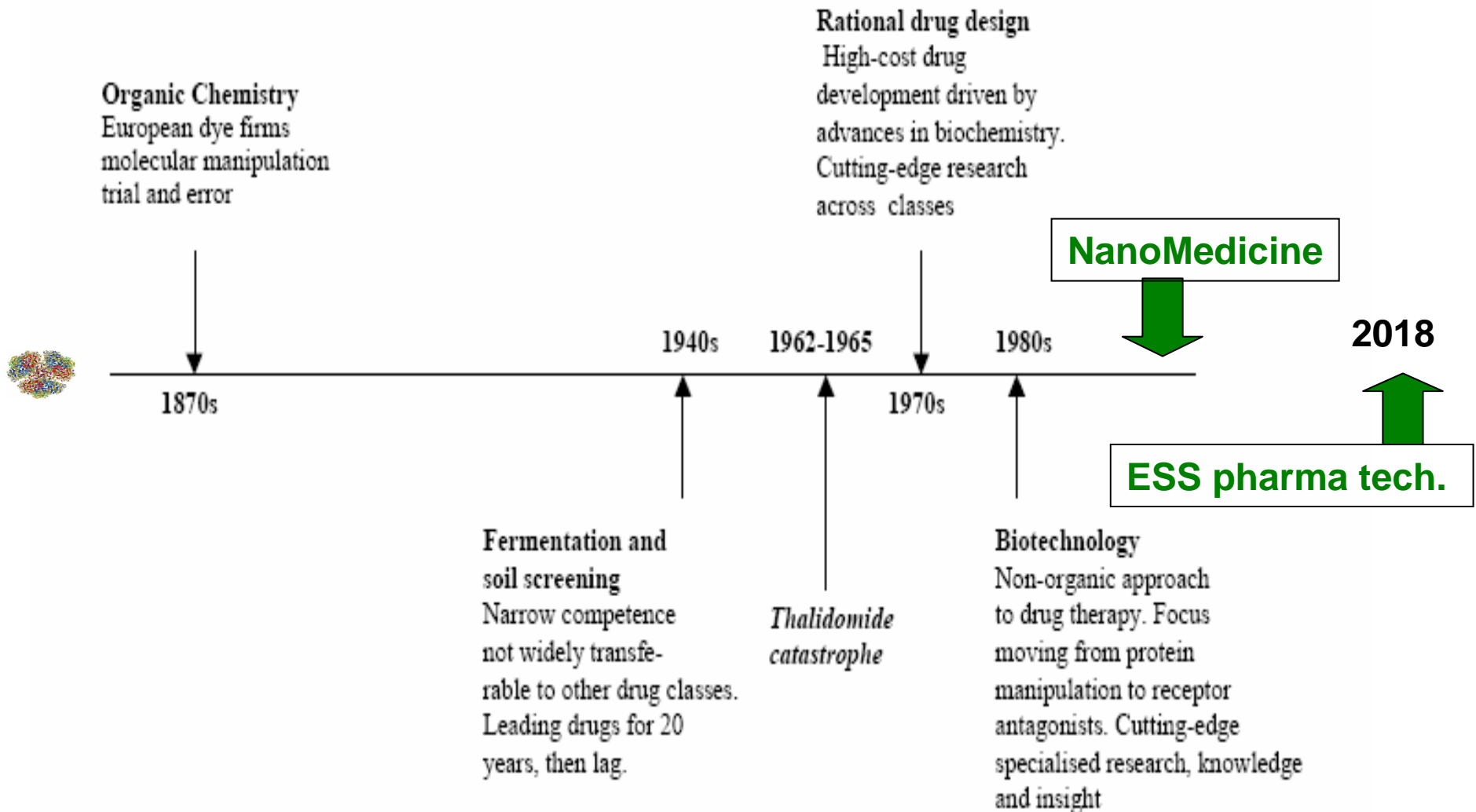


ETP: European Technology Platform
TTO: University Technology Transfer Office
TTA: Technology Transfer Accelerator of the ETP Company
FDI: Foreign Direct Investment

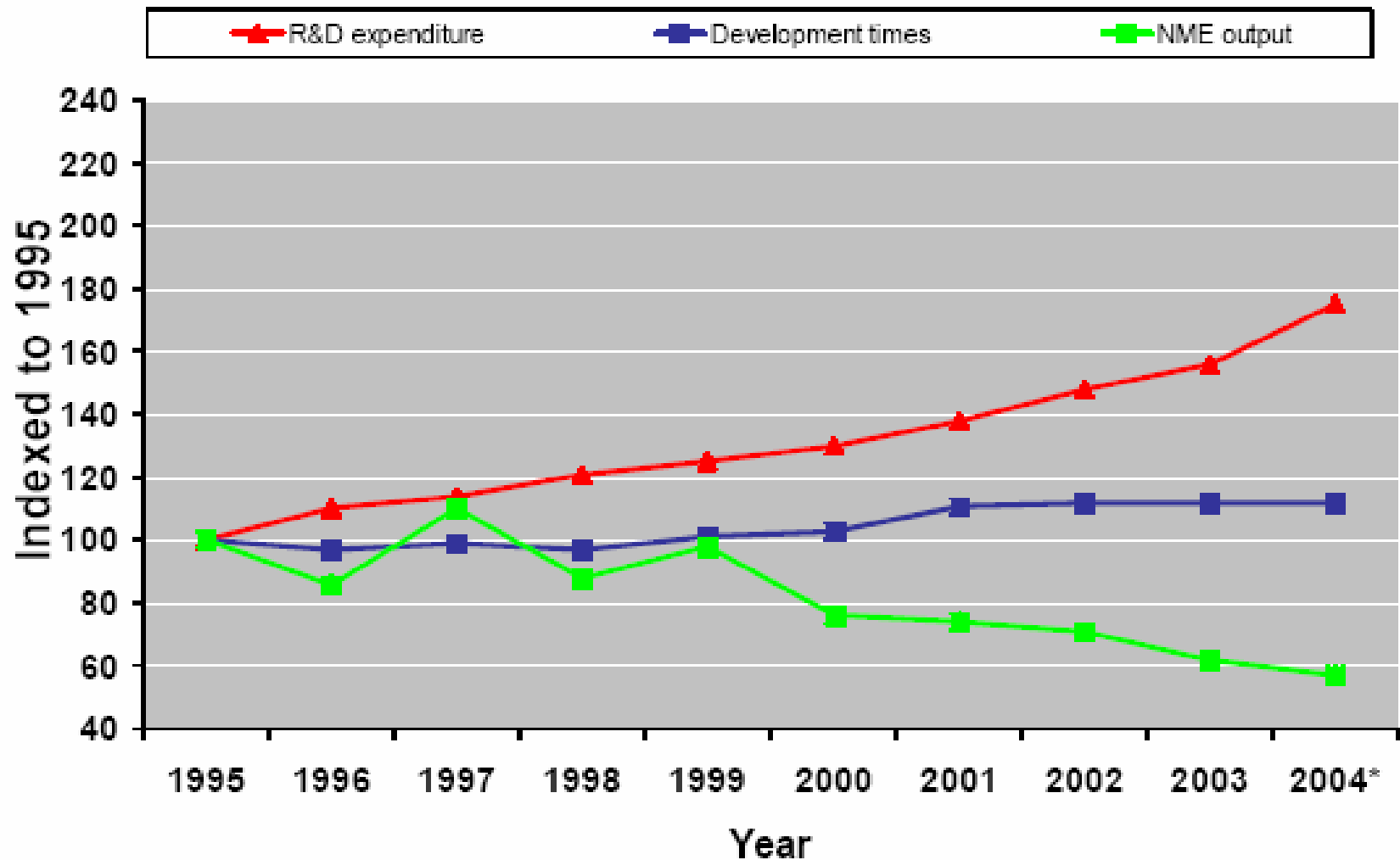
European Spallation Source (ESS)

- **Nothing like this exists yet in Europe.** Two such facilities are, however, currently being built in the USA and Japan.
- **In the research sector**, there is interest in the ESS in **structural biology**, materials research, micro- and nanotechnology and neutron research.
- **In industry**, there is a declared interest from the materials field (vehicles, steel/metal) and **in the pharmaceutical and biotechnology sectors.**
- When it is in operation some 500 employees will be needed to run the facility. The operations of the ESS will be visited by some 4 000–5 000 researchers every year. The total investment for the ESS will amount to some **1,2 billion Euro over a ten-year period.** Operating costs will amount to about **100 million Euro per year.**

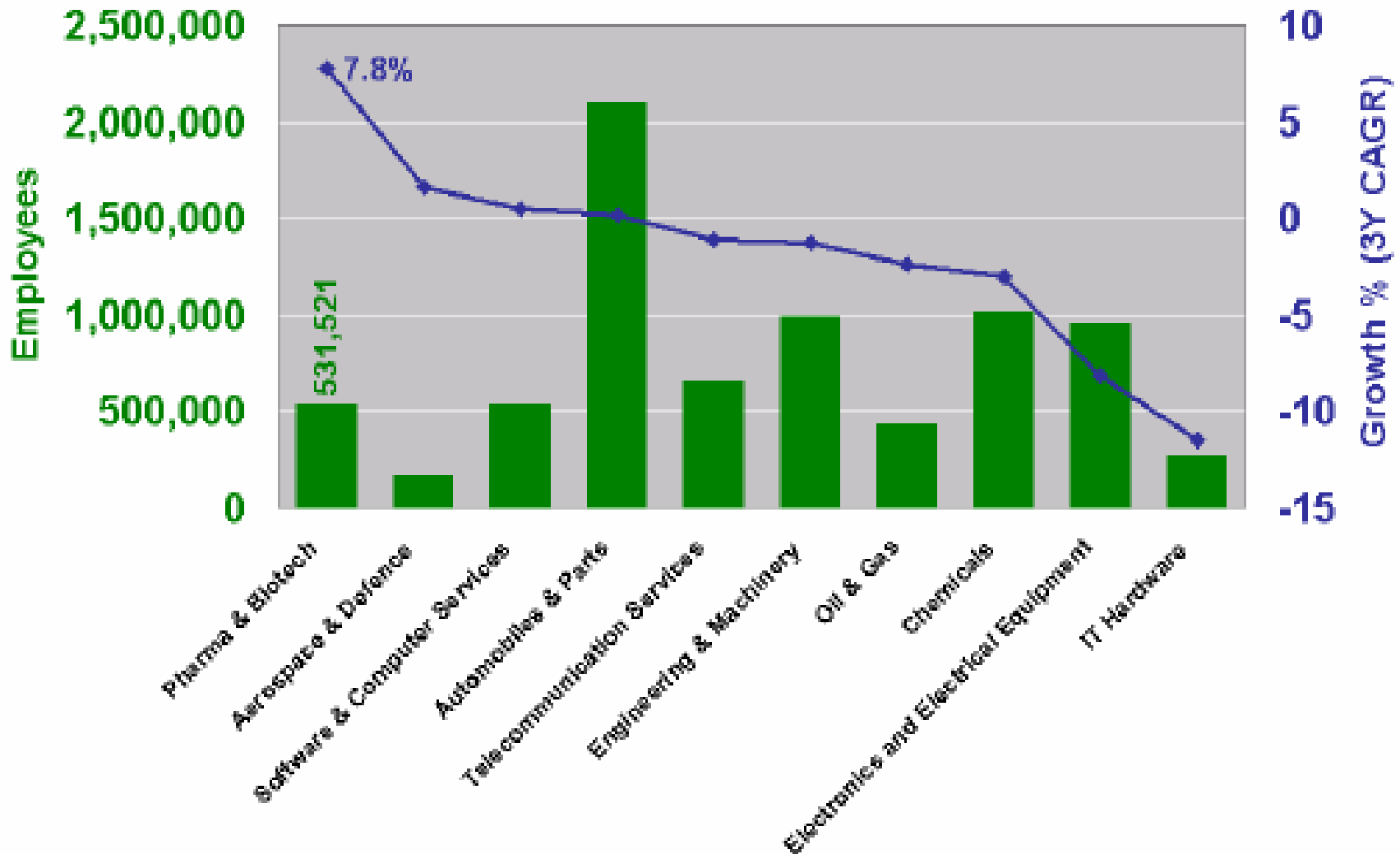
Technology-based competencies in the pharmaceutical industry.



Global R&D Expenditure, Development Times and NMEs 1995–2004



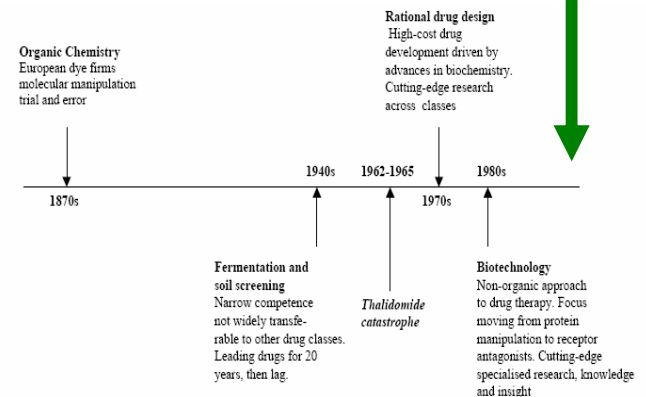
R&D Employees of Europe's Biopharmaceutical Industry 2004



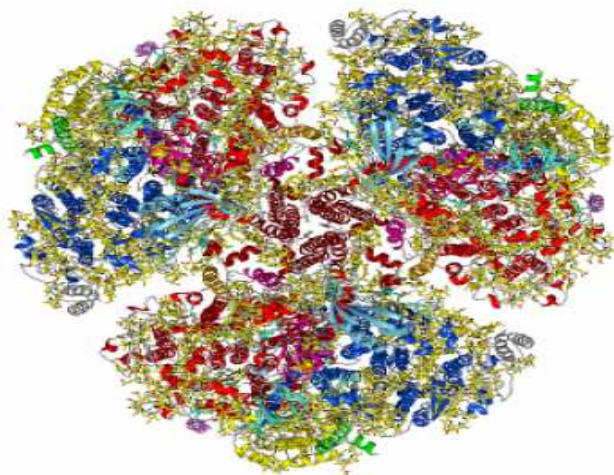
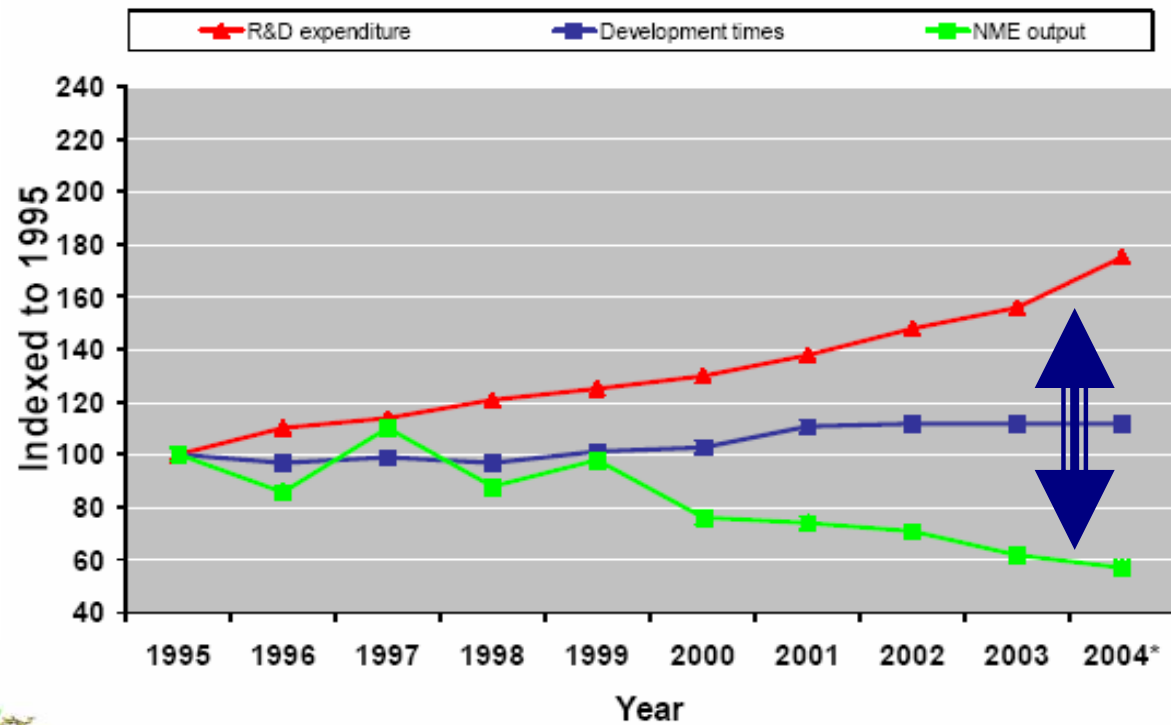
Costs of a Drug

Costs for the different phases are the following
(note that the total amounts include the costs of failures):

– Drug Discovery Costs:	44%	(EUR 277m)
– Pre-Clinical trials:	6%	(EUR 40m)
– Pharma development:	9%	(EUR 55m)
– Clinical trials:	41%	(EUR 261m)
Phase I:	2%	(EUR 5.6m)
Phase II:	13%	(EUR 34m)
Phase III:	85%	(EUR 222m)



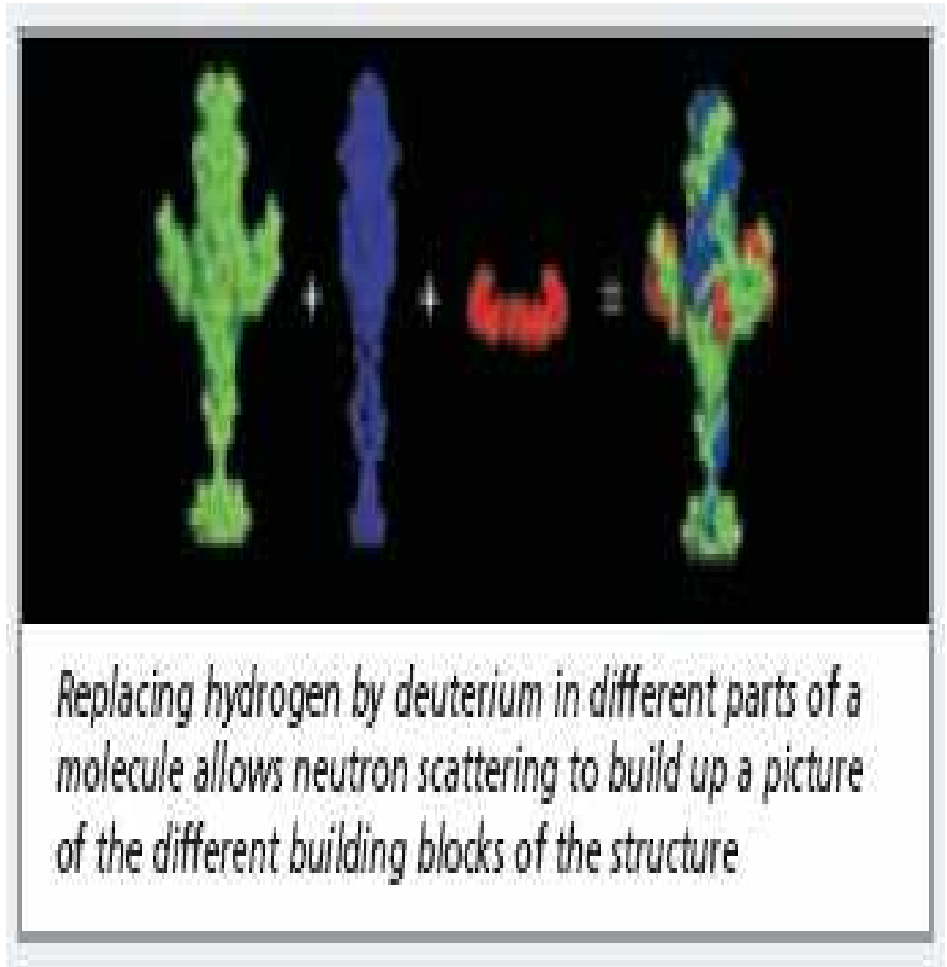
Are we need a new pharma paradigm?



Reduce time and lower the costs!

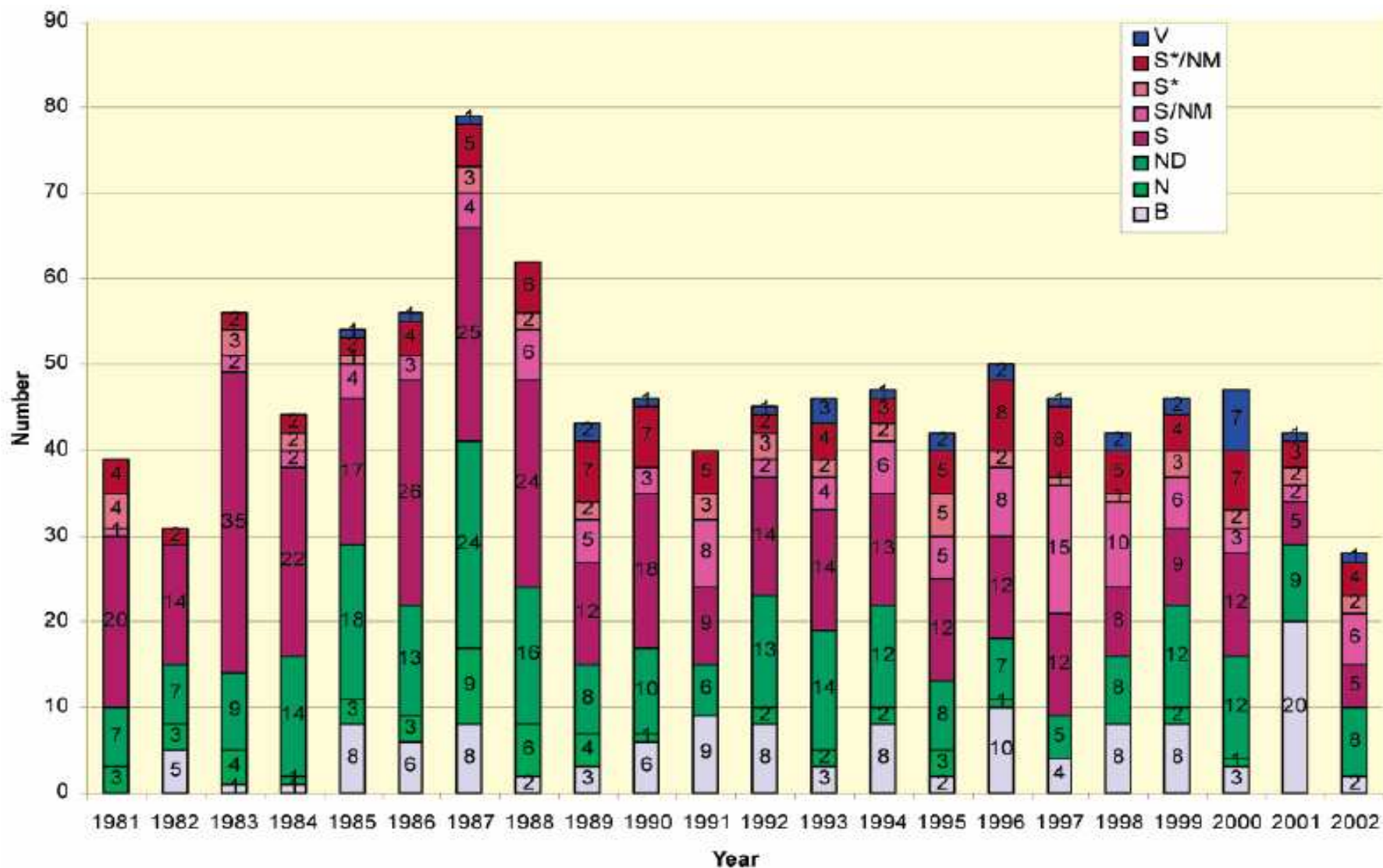
We need new technologies ...

- Development of **safe and efficient** targeted drug delivery systems, such as in gene therapy
- Exploitation of **natural (compounds)** antibiotics in the treatment of drug resistant pathogens
- Protein folding and misfolding; degenerative diseases
- Understanding the associated processes at a molecular level

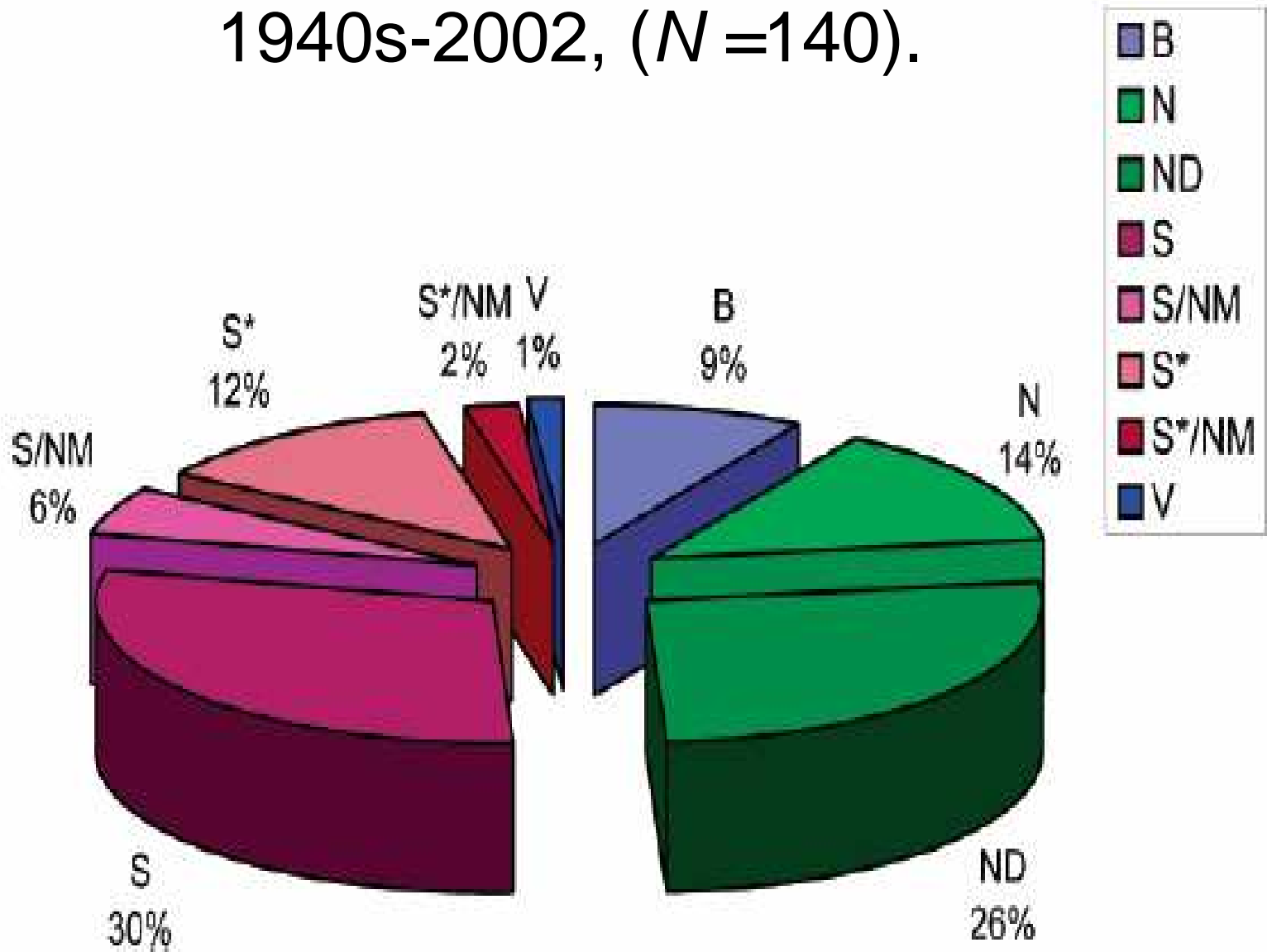


... and new starting materials

All new chemical entities organized by source/year, with "Natural" (ND, N) subdivisions (N= 1031).



All available anticancer drugs, 1940s-2002, ($N=140$).



New Chemical Entities and Indications by Source of Compound (N=868)

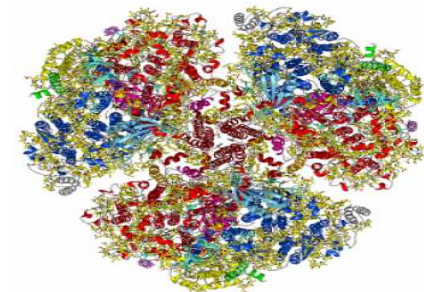
indication	total	origin of drug						indication	total	origin of drug						
		B	N	ND	S	S*	V			B	N	ND	S	S*	V	
analgesic	15				13	2		antiviral	35	2		1	8	24		
anesthetic	5				5			anxiolytic	10				10			
anti-Alzheimer's	4		1		3			benign prostatic hypertrophy	4		1	2	1			
anti-Parkinsonism	10			2	4	4		bronchodilator	8			2		6		
antiallergic	15		1	3	11			calcium metabolism	17			8	9			
antianginal	4				4			cardiotonic	13			3	5	5		
antiarrhythmic	15		1		12	2		chelator & antidote	5				5			
antiarthritic	12	2		1	9			contraception	6			6				
antiasthmatic	12			2	8	2		diuretic	4				4			
antibacterial	90		9	61	19	1		gastroprokinetic	4				3	1		
anticancer	79	12	9	21	25	10	2	hematopoiesis	5	5						
anticoagulant	16	3		12		1		hemophilia	9	9						
antidepressant	21				19	2		hepatitis	17	7				1	9	
antidiabetic	23	12	1	2	7	1		hormone	20	10		10				
antiemetic	7				1	6		hormone replacement therapy	4			4				
antiepileptic	10			1	6	3		hypnotic	11				11			
antifungal	24	1		2	21			hypocholesterolemic	9		3	1	2	3		
antiglaucoma	13			4	5	4		hypolipidemic	8		1		7			
antihistamine	12				12			immunostimulant	10	4	3	2	1			
antihyperprolactinemia	4			4				immunosuppressant	10	4	5	1				
antihypertensive	75			1	40	34		muscle relaxant	10			4	3	3		
antiinflammatory	50	1		13	36			neuroleptic	10				8	2		
antimigraine	10				3	7		nootropic	8			3	5			
antiparasitic	13		2	5	4	2		platelet aggregation inhibitor	4			3	1			
antipsoriatic	4			3		1		respiratory distress syndrome	6	3	1		2			
antipsychotic	7				5	2		vasodilator	6			3	3			
antithrombotic	28	13	1	5	7	2		vulnerary	5	2		2	1			
antiulcer	32	1	1	12	18			grand total	868	91	40	209	386	131	11	

ESS-Pharma

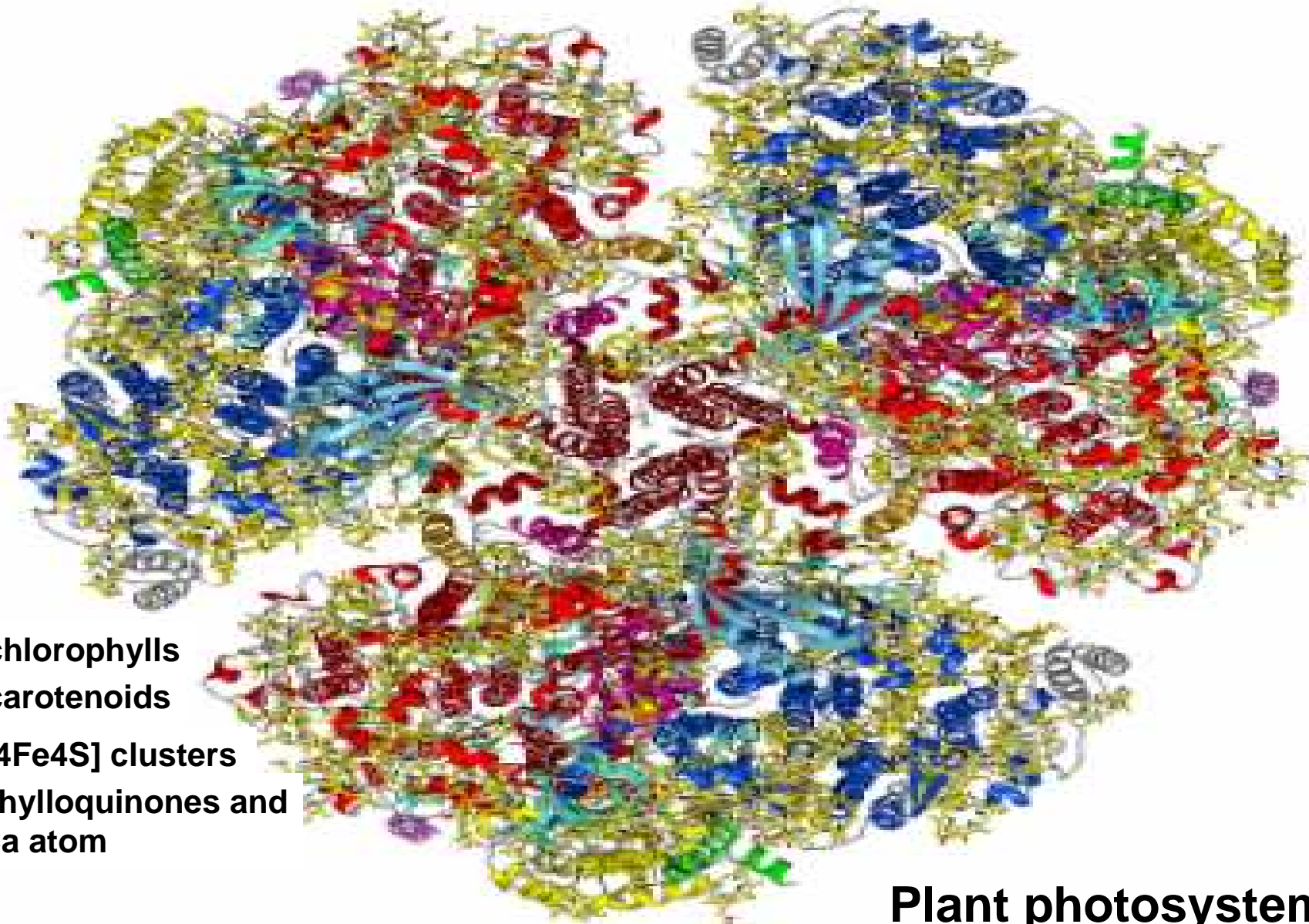
One special option for Hungary & Europe: characterizations of the natural molecules

Natural products play a dominant (29%) role in the discovery of leads for the development of drugs

Much of nature (94% of plants) remains to be explored: traditional medical herbs, marine and microbial environments.



Thank you for your kind attention!



96 chlorophylls
22 carotenoids
3 [4Fe4S] clusters
2 phylloquinones and
1 Ca atom

Plant photosystem-I