

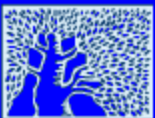
The Weizmann Institute *of Science for the Benefit of Society*

Mudi Sheves, Vice President for Technology Transfer
The Weizmann Institute

The Weizmann Institute of Science



Curiosity Driven Research



Weizmann Approach: Basic Research Landscape

Basic Science only

Physics

Imbedded multidisciplinary
approach

Mathematics

Graduate school and
Public Education

Biology

Chemistry

High level education program

Technology transfer-
Yeda



What will be the next scientific revolution?



Who will make the next scientific revolution?



The next scientific revolution will be driven by scientists who have a multidisciplinary view of science, the opportunity to take risks, the infrastructure to work, and the freedom to think.



We invest in excellent people with excellent ideas



Curiosity driven



The Weizmann Institute of Science 2009 Nobel Prize in Chemistry

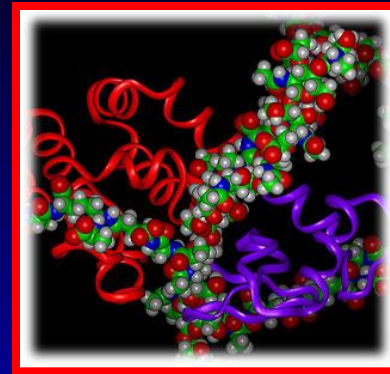
Prof. Ada Yonath

Nobel Prize in Chemistry 2009

"for studies of the structure and function of the ribosome"



Applied vs Basic



Top Down



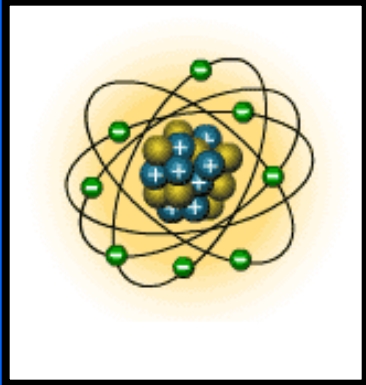
Bottom Up

Demand driven

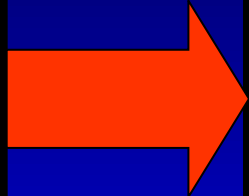
Curiosity driven

From Basic Science to Products: The Linear Model

Basic
Science



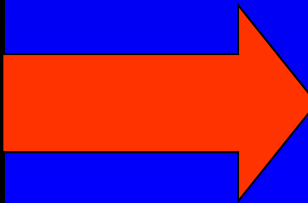
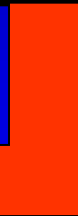
I



Applied
Research



II



Industrial
Development



III

Products



IV

To succeed in science you need 3 **G**'s

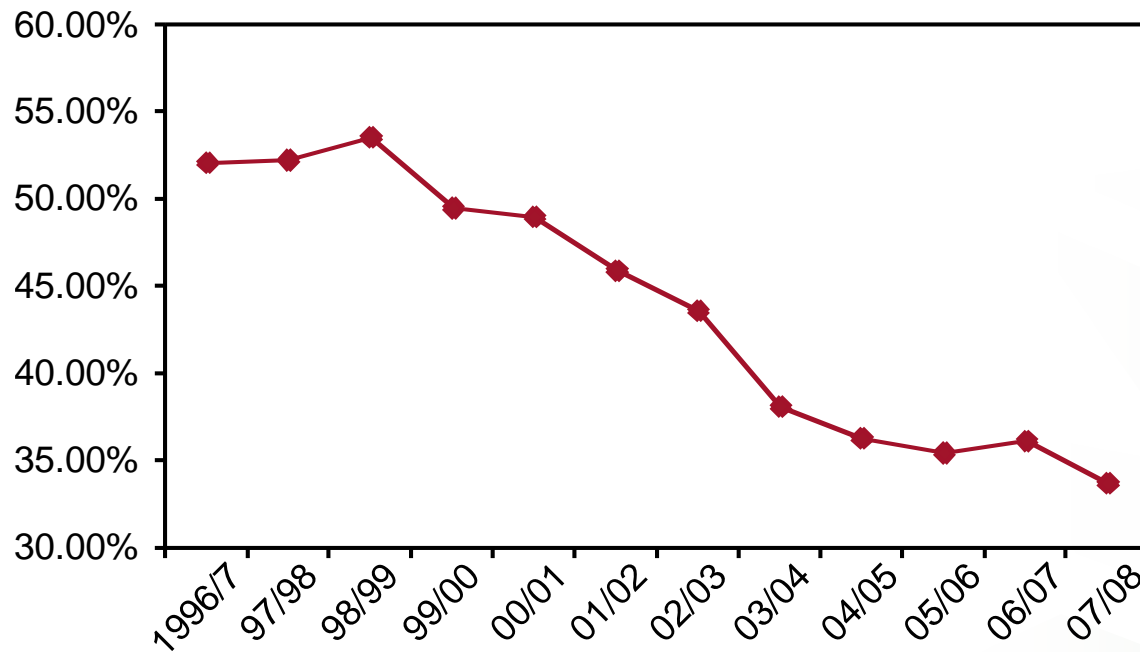
Paul Ehrlich (1902)

Gedacht = Original Ideas

Geduld = Patience

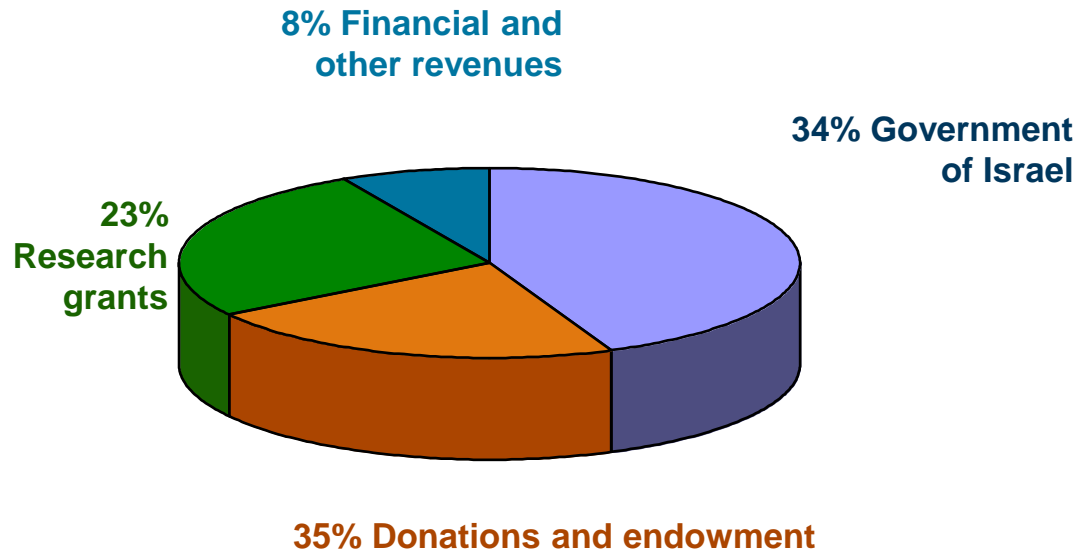
Geld !! = Money !!

Trends in Government Support



Weizmann Budget

Budget: ~\$300 M



Technology Transfer Tradition

1915

Professor Chaim Weizmann invented a new bio-technological method to produce acetone from starch while working as a Researcher at the University of Manchester.

1916

Weizmann (that owned over 100 patents) applied for a patent and transferred the technology to the British Navy.

1917

Weizmann was appointed to head the Navy Laboratories, which successfully mass produced acetone which was used to produce explosives during WWI.

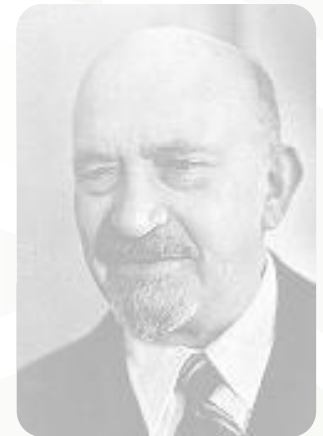
After the war, this became the common industrial method for Acetone production.

1934

Weizmann Established the Daniel Sieff Research Institute, which later became the Weizmann Institute of Science.

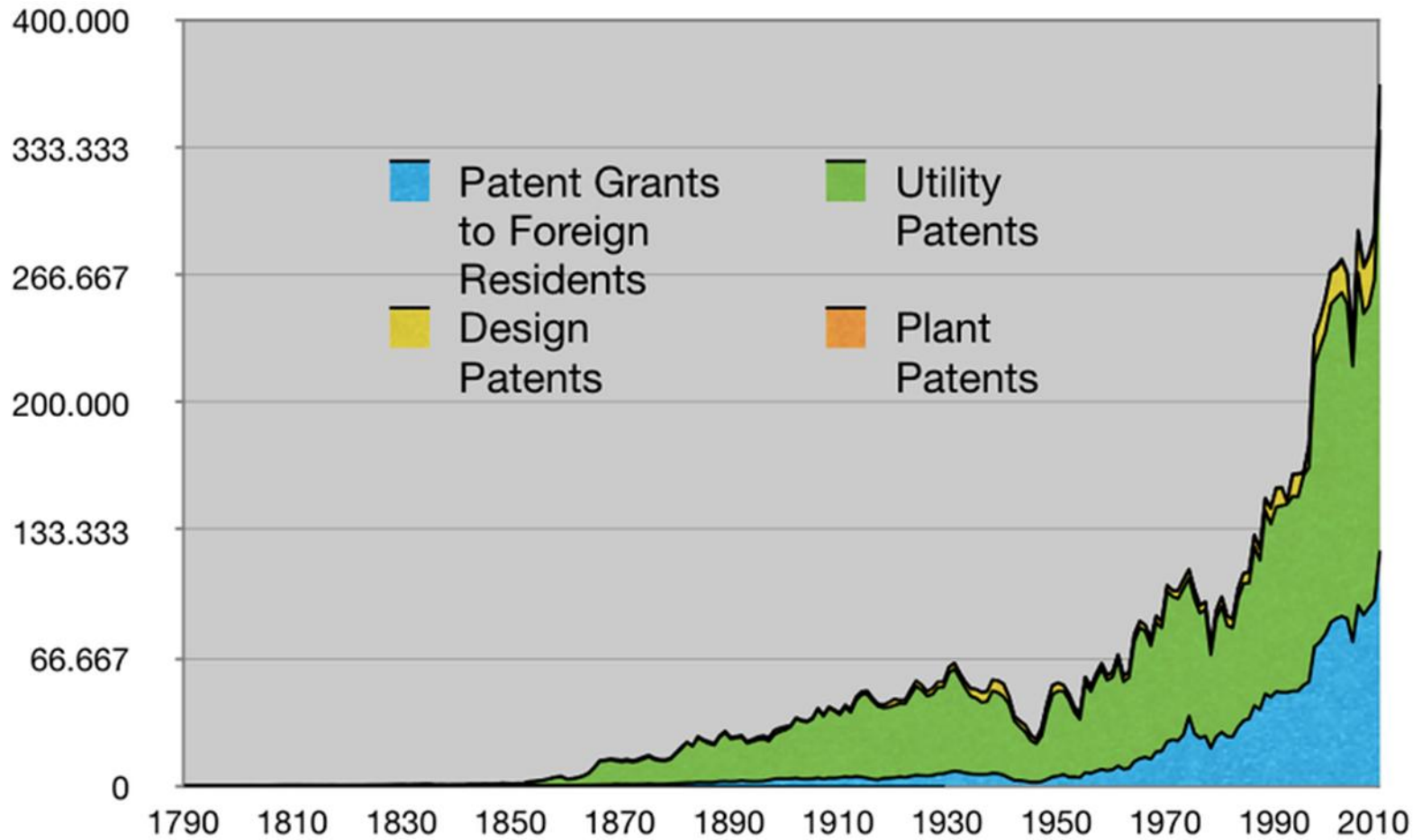
1948

Weizmann became Israel's first president.



"Everything that can be invented has been invented"

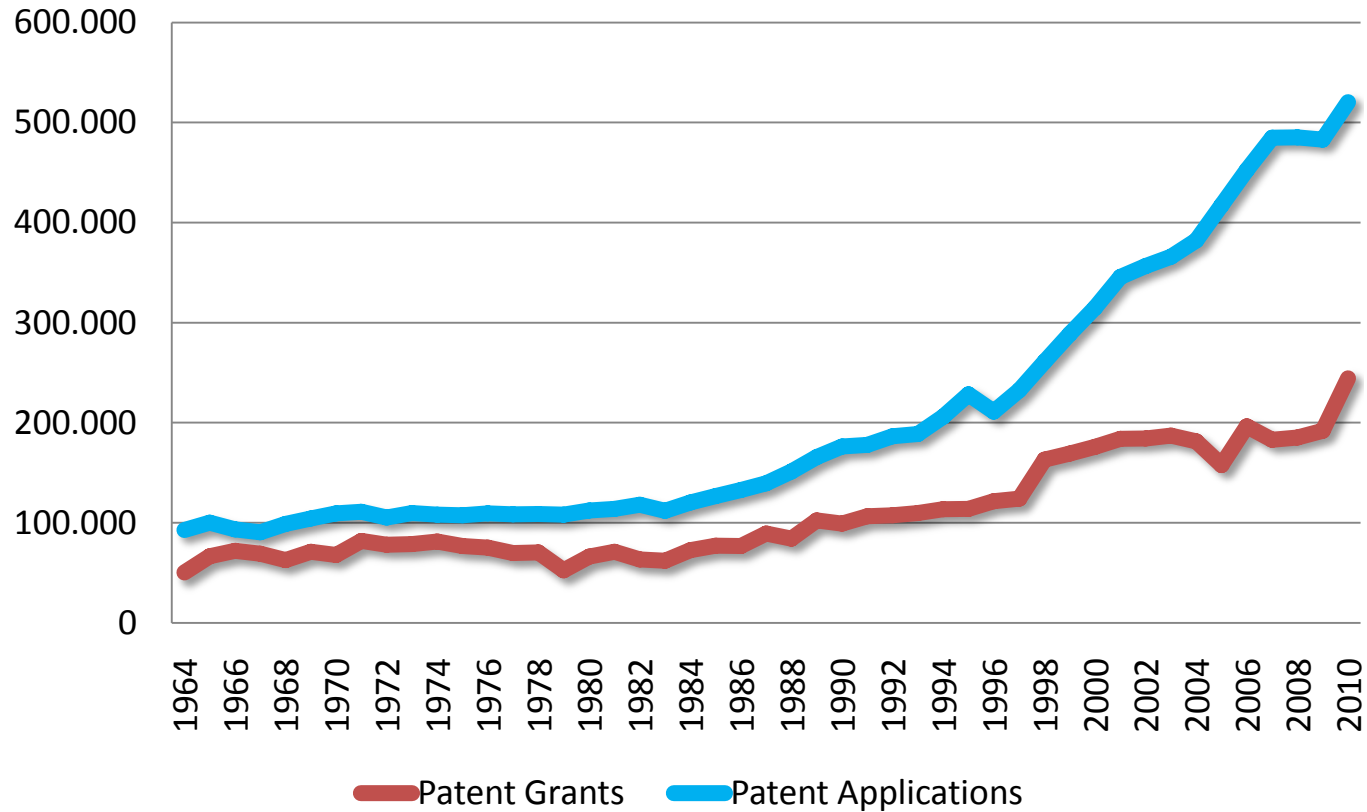
CHARLES H. DUELL, Commissioner US. Office of patents, 1899.



U.S. patents granted, 1790–2010.

U.S. Patent Statistics Chart

Calendar Years 1963 - 2010



“It’s tough to make predictions, especially about the future”

Niels Bohr

•“Who the hell wants to hear actors talk?”

Harry M. Warner, Warner Bros., 1927.

•“ I think there is a world market for maybe five computers” THOMAS WATSON, chairman of IBM, 1943

•“ There is no reason for any individuals to have a computer in their home” KEN OLSEN, president, and chairman of Digital Equipment Corp, 1977



Basic Science:
The serendipity model
X-ray

Serendipity:

The faculty of making fortunate discoveries by accident.



Röntgen



Crookes tube

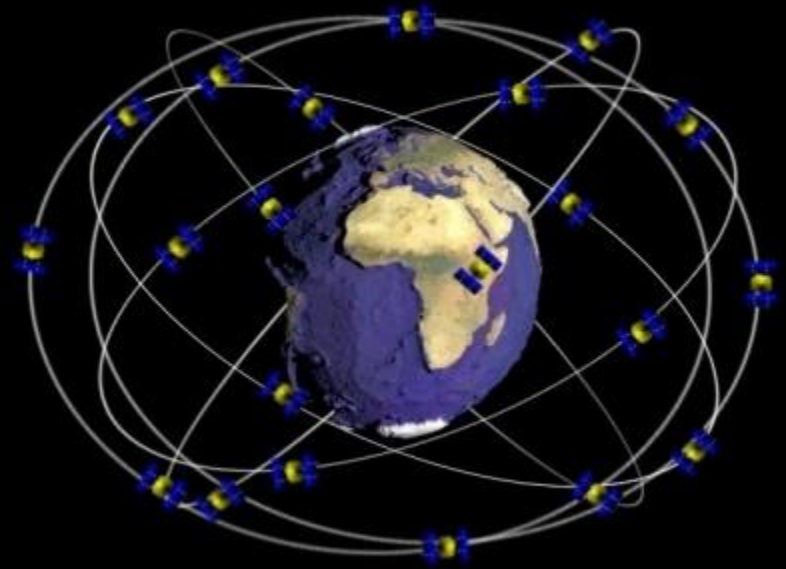
Röntgen was "playing" with a Crookes tube, and tried to understand the behavior of electric current in such a device.



Röntgen
wife's hand

Basic science:
The initially
unknown applications

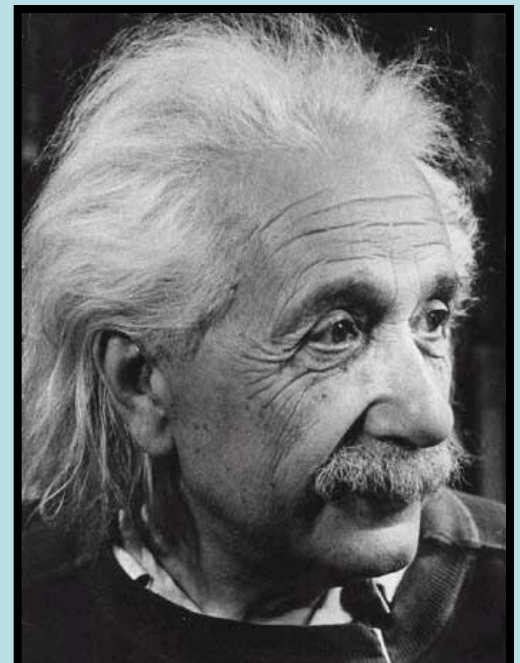
Atomic
clock



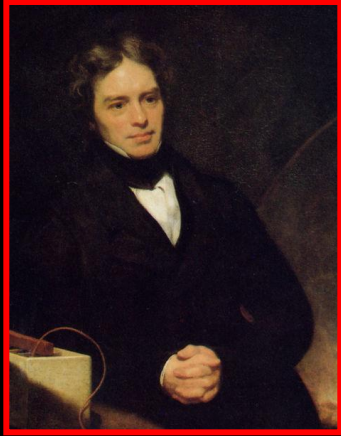
GPS: Global Positioning System



Theory of
relativity



Basic Science
is not
Research and Development



Michael Faraday
1791-1867

Faraday's experiments on electricity, were driven by curiosity but brought us in the modern era of electricity.



Electric light came from innovation driven by basic science.



No amount of R&D on the candle could ever have done that.

Technological developments are fueled by **scientific innovations** coming from academia. Therefore, transfer of new ideas and discoveries from academia to the private sector is **essential to the industry**.

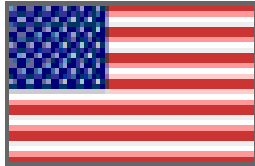

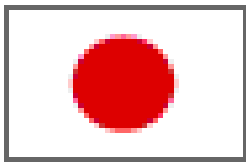
too little

“Society, having funded much[√] of the university based research, has an expectation that the fruits of that research will improve the human condition.”

Niels Reimers, 1987

Academic tech. Transfer companies in Israel

Weizmann Institute	Yeda	1959
Hebrew University	Yissum	1964
Tel Aviv University	Ramot	1973

		
1980's	1990's	1998

Academia

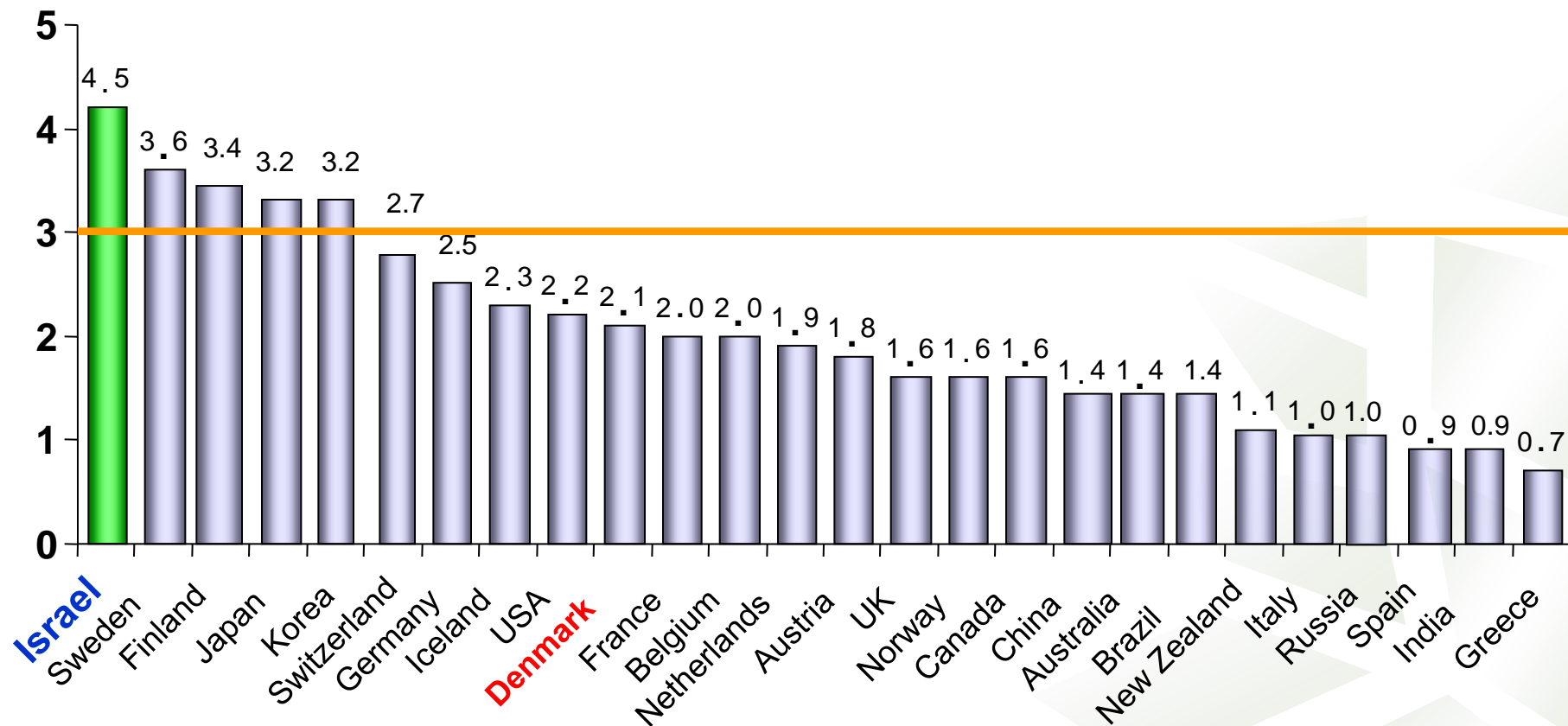
Industry

**The death
valley**

**BTG
Funds**

**OCS tools
Incubators
Angels**

Expenditure on Civilian R&D Percent of the GDP - Israel and OECD Countries



Yeda/Weizmann Success Stories

Selected Success Stories

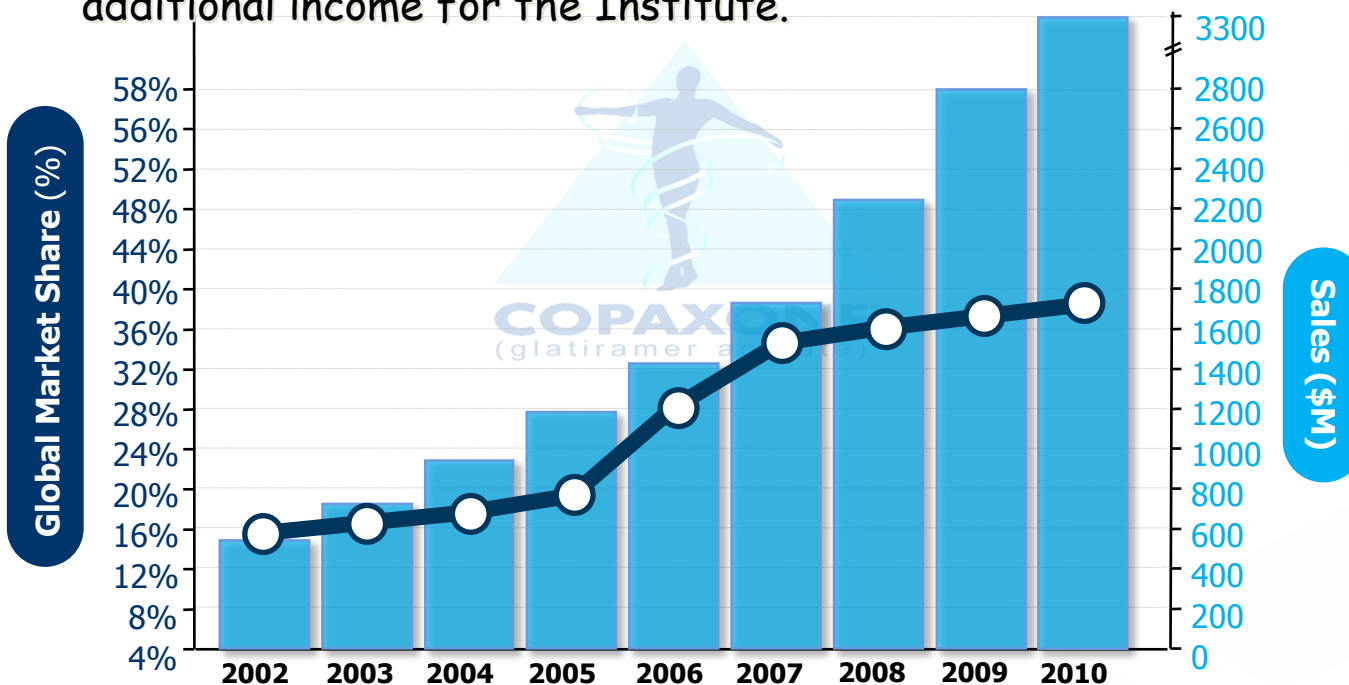
▶ COPAXONE®

- ▶ Indicated for Multiple Sclerosis
COPAXONE represents **a new class of drugs** for the treatment of the disease
- ▶ Copaxone is a synthetic copolymer acting as an immunomodulator
- ▶ 1971: First Patent filed by Yeda
- ▶ 1987: Licensed to Teva Pharmaceuticals Ltd.
- ▶ 2012 Sales: **\$US 4 Billion**



Yeda Research & Development Co. Ltd. Combining Benevolence & Business

- Allow society to benefit from discoveries made at the Weizmann Institute of Science.
- Effectively commercialize technologies developed at Weizmann to create additional income for the Institute.

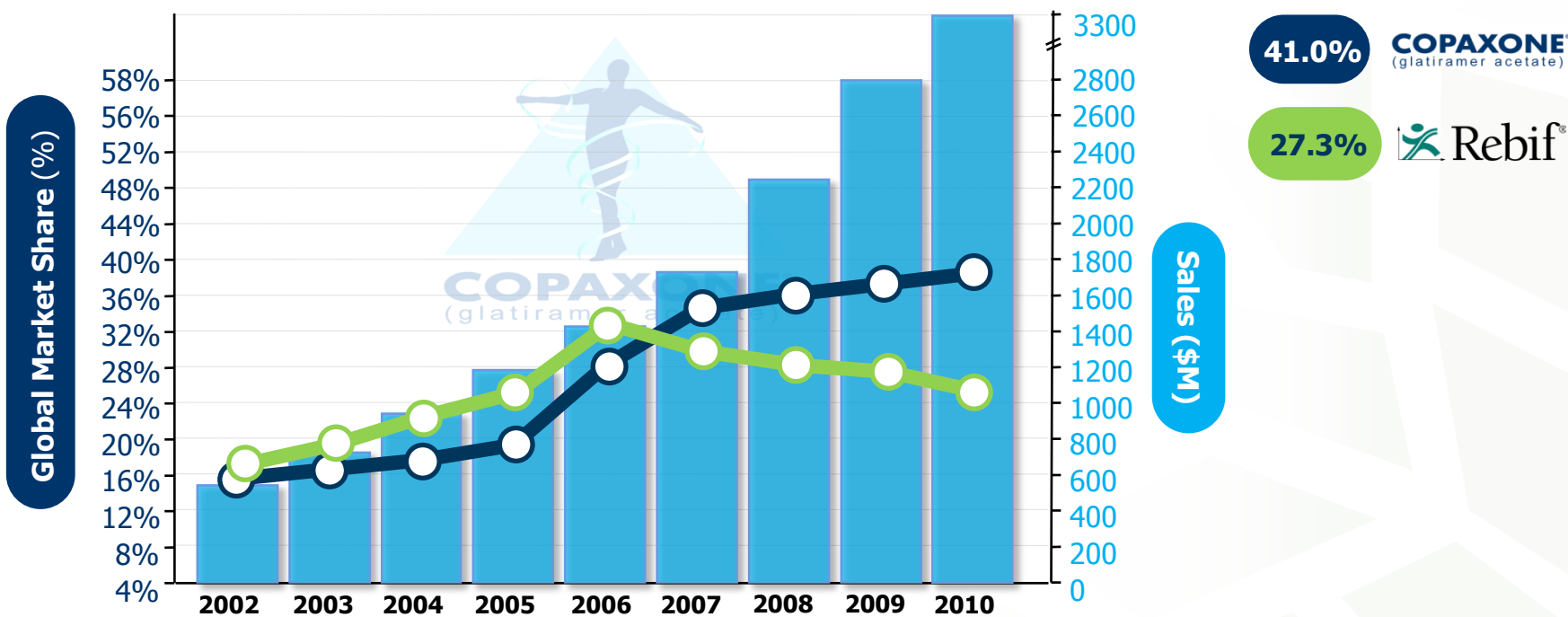


Source: Annual Companies reports for- Copaxone, Rebif & Avonex



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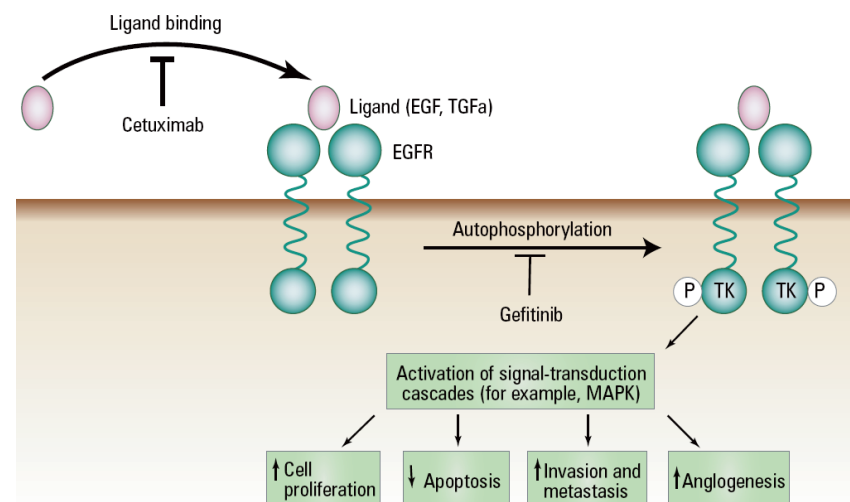
Yeda/Weizmann Success Stories

Selected Success Stories

Erbitux™

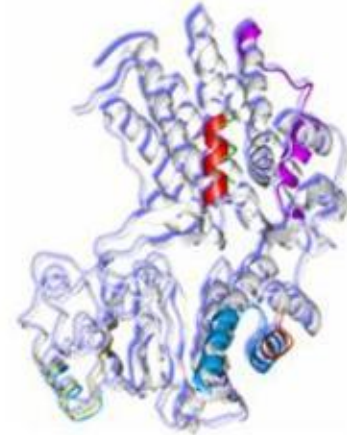
- Erbitux is an antibody based therapy presenting synergism with conventional chemotherapy.
- The synergistic effect was invented by Prof. Sela's group at WIS between 1987-88.
- Erbitux was developed by ImClone Systems and approved by the FDA in 2001.
- Estimated yearly sales - \$1.5 billion.

ERBITUX™
CETUXIMAB INJECTION

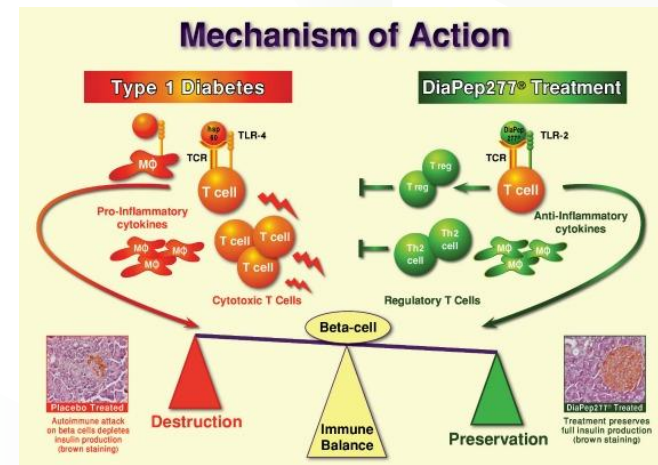


A Drug for Type 1 Diabetes Developed by Prof. Irun Cohen – Phase III

- ▼ **DiaPep277[®]** is a unique peptide, containing 24 amino acids, is derived from the sequence of the human heat shock protein 60 (Hsp60).
- ▼ The peptide acts by modulating the immune system, preventing the destruction of the pancreatic cells that secrete insulin.
- ▼ It appears that the patients treated with the drug for a year or more had significantly higher pancreas function than those in the control group.
- ▼ Licensed to Andromeda Biotech.



DiaPep277[®]



Yeda/Weizmann Success Stories

Selected Success Stories

▶ NanoLub™

- ▼ NanoLub™ is the world's first commercial solid lubricant based on spherical inorganic nanoparticles.
- ▼ NanoLub™ reduces friction & wear significantly better than conventional lubricants.
- ▼ 2002: Licensed to Nanomaterials Inc.
- ▼ Potential Uses: • oils & greases • impregnating parts • polymer composite films & metal composite coatings



Yeda Research & Development Co. Ltd. a world leader in Technology Transfer

- ▼ Dozens of “**Weizmann-Inside**” products on the market.
- ▼ Total annual Weizmann products sales in 2012:
21 Billions \$.
- ▼ **Over 40 new companies** were established around Yeda’s technologies – 24 in the last 6 years.
- ▼ Yeda owns a largest portfolio of patents in Israel:
600 live patent families, with over 1,500 patent families filed since 1971.



Yeda Research & Development Co. Ltd.

Licensing Income

Licensing Income Survey 2010 top 10 Universities*

	Institution	Licensing Income (\$M)
1	City of Hope National Medical Center. & Beckman Research	202
2	Northwestern Univ.	179
3	NYU	178
4	Columbia Univ.	147
5	Sloan Kettering Inst. For Cancer Res.	139
6	Univ. California System	104
7	Wake Forest Univ.	85
8	Univ. of Minnesota	83
9	The General Hospital dba Massachusetts General Hos.	77
10	Univ. of Washington	69

* Source: AUTM Licensing Survey 2010



How?

Yeda Research & Development Co. Ltd.

Favorable **Environmental** Conditions

- ▼ **Legal structure similar to Bayh-Dole act**
 - ▶ IP owned by the Institution
 - ▶ Sharing royalty with the inventors
- ▼ **Government support programs**
 - ▶ Incubators
 - ▶ Direct tech transfer support programs
- ▼ **Developed VC community, Entrepreneurs**



Internal Conditions for successful Tech Transfer

- Scientists' focus on excellence in **Basic Science**, not on commercialization.
- A **pro-active** tech transfer operation.
- Tech Transfer officers: background in **Business and Academia**.
- A few years of investment by the University (patents, marketing, agreements) before income is generated.
- Clear **internal IP rules**, enforced by University management.

However!

Academy-Industry cooperation, as love making between hedgehogs. It is a desired activity that has to be exercised with extreme caution.



Thank you for your attention