



# Bayer Environmental Science

Product Development Made Simple:  
A quarter billion dollars and 10 years.



Bayer Family of Vector Products

**Permanone**<sup>®</sup> **Aqua-Reslin**<sup>®</sup>

**Suspend**<sup>®</sup> **SC**  
with DeltaGard **Pyrenone**<sup>®</sup>

**Scourge**<sup>®</sup>

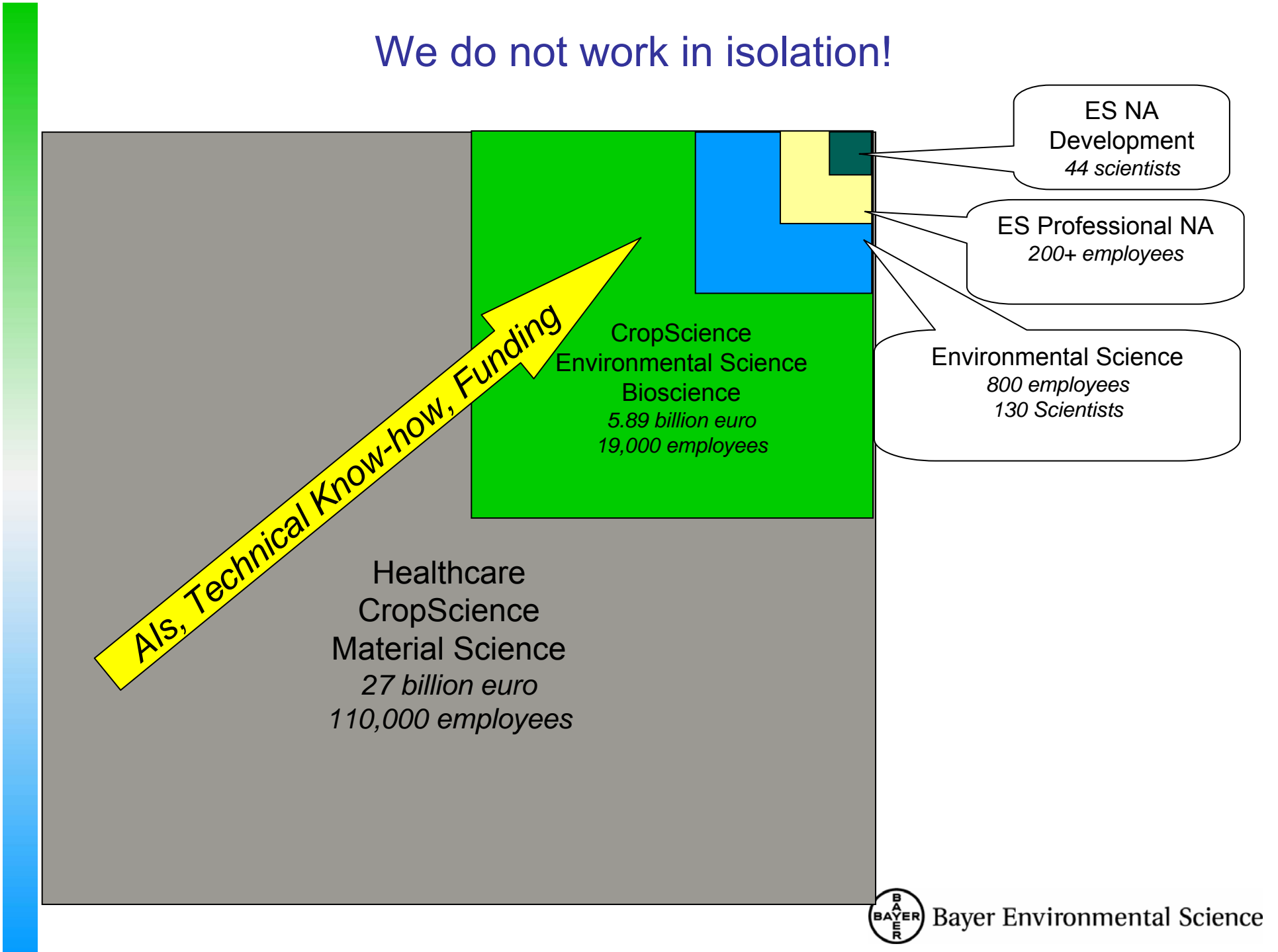


**BACKED**  
by **BAYER**<sup>™</sup>



Bayer Environmental Science

# We do not work in isolation!



..and we have some impressive resources at our disposal!

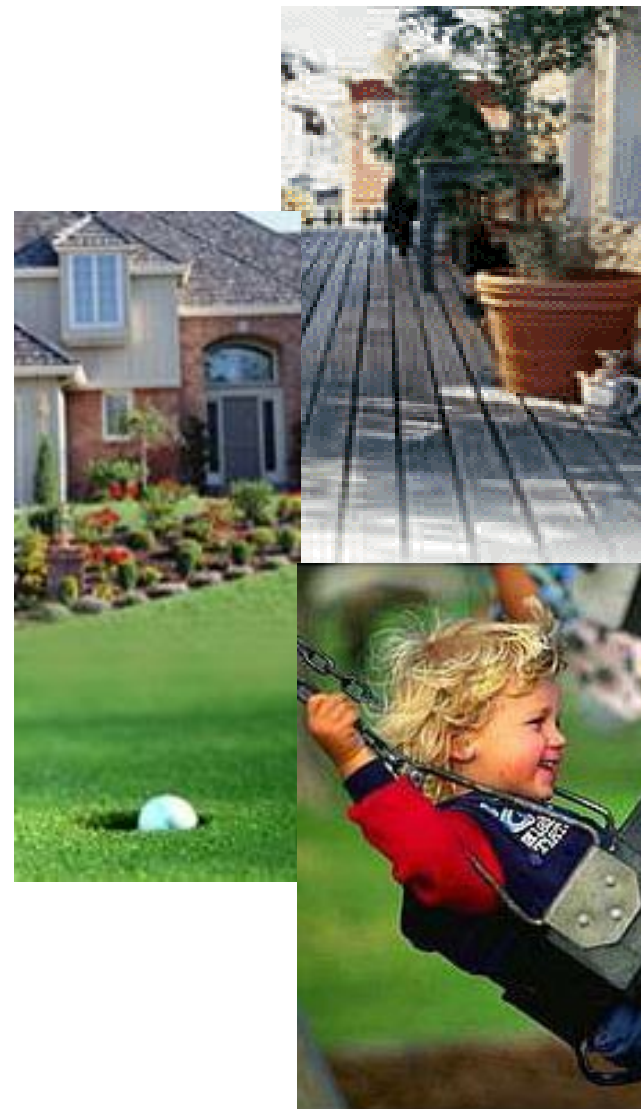
In 2005 Bayer CropScience invested  
>\$650 million on Research and  
Development

3700 scientists Worldwide

In 2005 Bayer Environmental Science  
spent \$60 million on Product  
Development and Technical Service

\$20m spent by BES in North America

BES invests \$3m annually with North  
American universities



Bayer Environmental Science

# Industry Leadership in Action

## BES Development and Training Center, Clayton, NC



# Industry Leadership in Action

## What's Buzzing ... the electronic newsletter of vector control industry

**What's Buzzing**  

- A Newsletter for Mosquito Control Professionals

Volume 1  
Issue 1  
Date June 22, 2005

### Spring Start-Up

How to care for products in storage, when you bring them out of storage and during use

#### General

- Prior to the end of the mosquito season, take an inventory of products to be stored and identify those that need special treatment, such as heated storage. An end-of-season inventory is also a good security precaution for insurance purposes and will help identify your oldest stock, which should be used first when the next season begins.
- Storage facilities vary considerably, but should be maintained at 60° to 80°F. Always store products in their original containers and ensure lids are fully closed.
- If products must be stored in unheated buildings during the winter, some formulations will settle, layer or crystallize during the colder months. This is a reaction to the cooler temperatures and is no cause for alarm. Before using these products, bring the product to a working temperature, approximately 70°F and then shake or agitate the container to remix all contents. Using of a drum warmer may be necessary. This should return the product to a homogeneous, usable state.
- When cold product is moved into a warmer area, remember it can take more than 24 hours for an contents to reach the warmer temperature. The time required to completely warm the product may be significantly longer when the initial temperature is very low or the vessel is large. Allow sufficient time for the product temperature to stabilize and fully agitate the product before use. If solid or crystalline particles are observed, the product may require more time for warming and agitation.



#### Water-based products

- FFAST products such as Aqua-Reslin®, which are water-based, can be frozen without harm. However, they must be thoroughly and gently warmed and agitated before use.
- When packaged in 1- or 2.5-gallon containers, these products may be warmed, inverted and shaken by hand to remix contents.
- Larger containers of Aqua-Reslin, such as 30-gallon drums, should be warmed in the sun, moved to a heated room or warmed by a drum warmer. They can then be agitated using the FFAST™ injector or carefully rolled back and forth until completely mixed. All FFAST products, regardless of how they are stored, should be agitated prior to use, especially when held for extended periods. Note: FFAST products are non-flammable.

#### Oil-based products

- Oil-based products such as Scourge®, Permanone® and Pyrenone®, when packaged in 1- or 2.5-gallon containers, should be warmed, inverted and shaken by hand to remix contents. Larger containers, such as 5-, 20-, or 55-gallon drums can be moved to a heated room or placed in the sun to warm, then rolled back and forth to thoroughly remix contents.

Always thoroughly read and follow all label instructions.



Bayer Environmental Science | 21 W. Alexander Drive, Research Triangle Park, NC 27709 | 1-800-333-2867 | BayerPhotoCentral.com | FFAST, Aqua-Reslin, Scourge, Permanone, Pyrenone and Backed by Bayer are trademarks of Bayer. © 2005 Bayer.

**What's Buzzing**  

- Newsletter for Mosquito Control Professionals

Volume 2  
Issue 1  
Date: February 2, 2006

### What is FFAST™?

#### The Challenge:

- Develop a formulation for ULV using water but one that will not evaporate quickly like standard EC formulations.

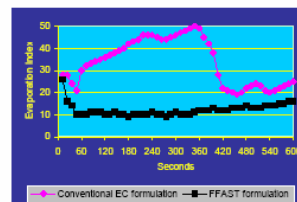
#### The Benefits:

- Water is friendlier to the environment.
- Water is better for workers since it prevents the practice of diluting with oil.
- Water requires no storage since in use with the FFAST Injector mixing is completed only when spray units are filled.
- Water is less expensive than oil when used as a diluent.

#### The Answer: FFAST

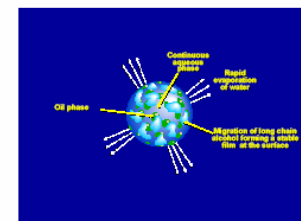
FFAST stands for Film-Form Aqueous Spray Technology. This patented technique that allows water droplets to behave as oil droplets. It is currently available only in Bayer Aqua-Reslin®.

FFAST formulations use long-chain alcohol molecules to form a protective film around each Aqua-Reslin droplet as it leaves the nozzle of ULV sprayers. This film makes droplets highly resistant to evaporation, so they maintain their optimum size while moving through the target zone effectively killing mosquitoes.

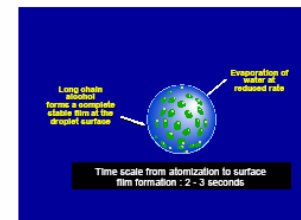


Evaporative rate of suspended droplets at 95° F and 30% RH.

Below is the sequence of events for a single droplet in a FFAST formulation from Bayer.



Migration of long-chain alcohol to the surface.



Long-chain alcohol forms a complete stable film at the droplet surface.

After more than 10 years of research, demonstration trials and use in mosquito control programs, Aqua-Reslin has proven to be a valuable tool in adulticide programs.



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Bayer Environmental Science

# Industry Leadership in Action

## Young Scientist of the Year

Bayer recognizes that tomorrow's business and technical solutions will come from today's young researchers

The program was designed to reward and encourage excellence in research by the next generation of scientific leaders in Urban Entomology

### 2006 Young Scientists:

- ◆ **Eric Paysen**, Clemson University  
*Faculty advisor: Dr. Pat Zungoli*
- ◆ **Alvaro Romero**, University of Kentucky  
*Faculty advisor: Dr. Kenneth Haynes*
- ◆ **Matthew Tarver**, University of Florida  
*Faculty advisor: Dr. Phil Koehler*



#### Judging Committee:

- ◆ Mark Sheperdigian, Rose Pest Solutions
- ◆ Dr. Nick Hamon, Bayer Environmental Science
- ◆ Greg Baumann, NPMA
- ◆ Dr. Roger Gold, Texas A&M University
- ◆ Frank Meek, Orkin
- ◆ Dr. Philip G. Koehler, University of Florida



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# Industry Leadership in Action

## Bayer Outreach - Schools and Science Education

'Making Science Make Sense' ([www.bayerus.com/MSMS](http://www.bayerus.com/MSMS))



Kevin Connally, BES Field Sales Rep, talking to school-aged children about insects and sciences at the Entomological Society of America's Eastern Branch community outreach program in Charlottesville, VA (March 12, 2006)



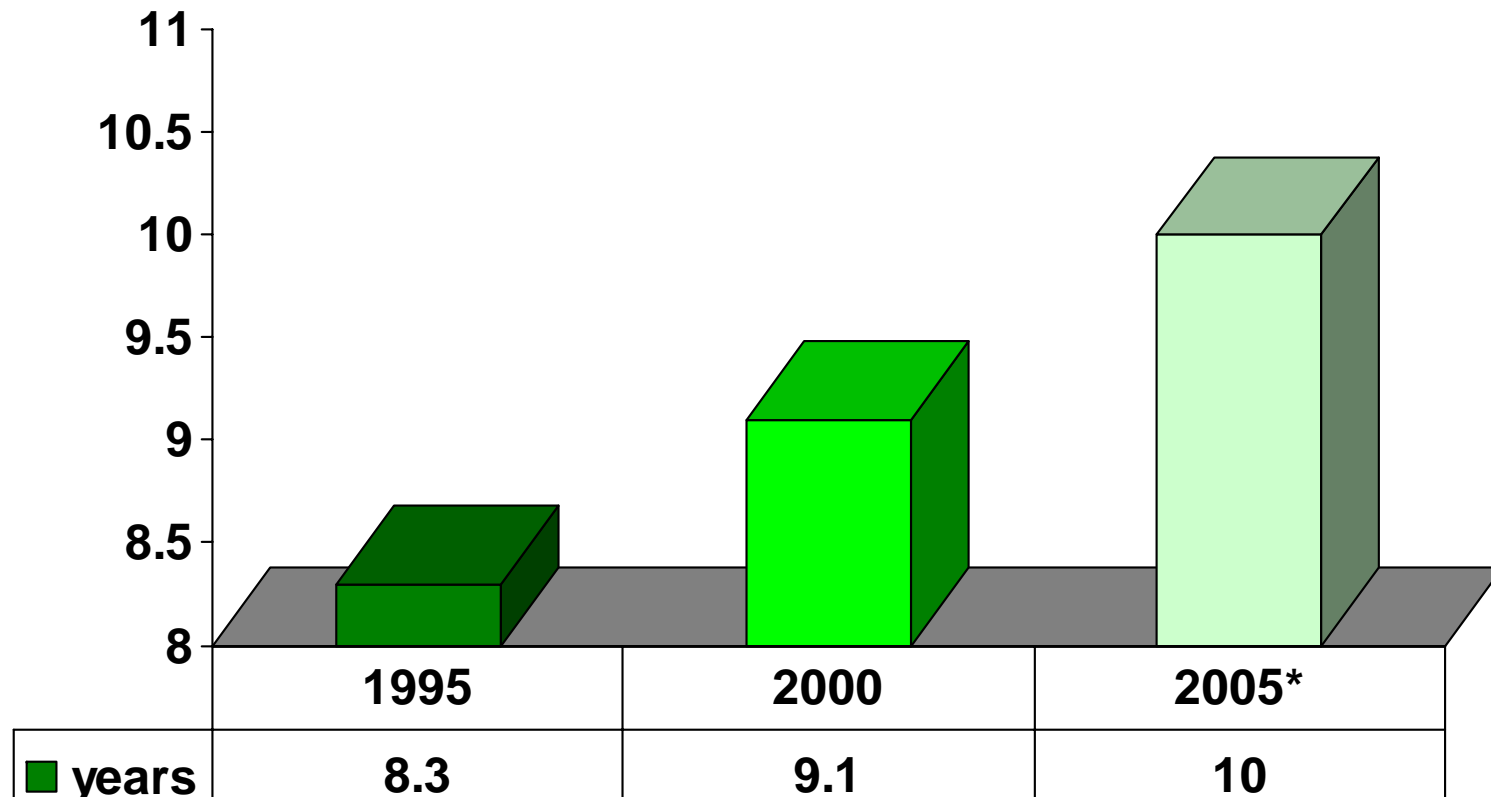
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# Industry Leadership in Action

## Long-term Commitment

Number of years between discovery and first sales



Phillips McDougall for American Crop Life / European Crop Protection Association

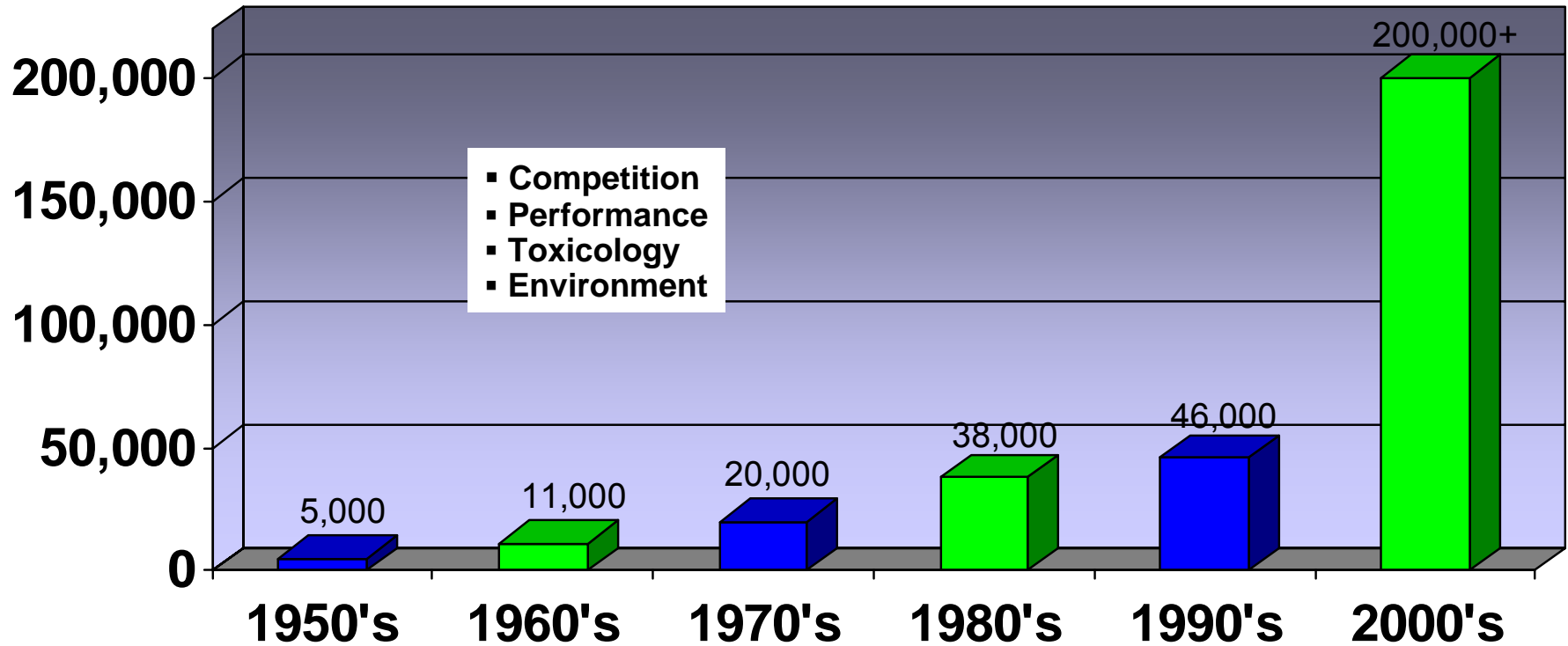
\* estimated



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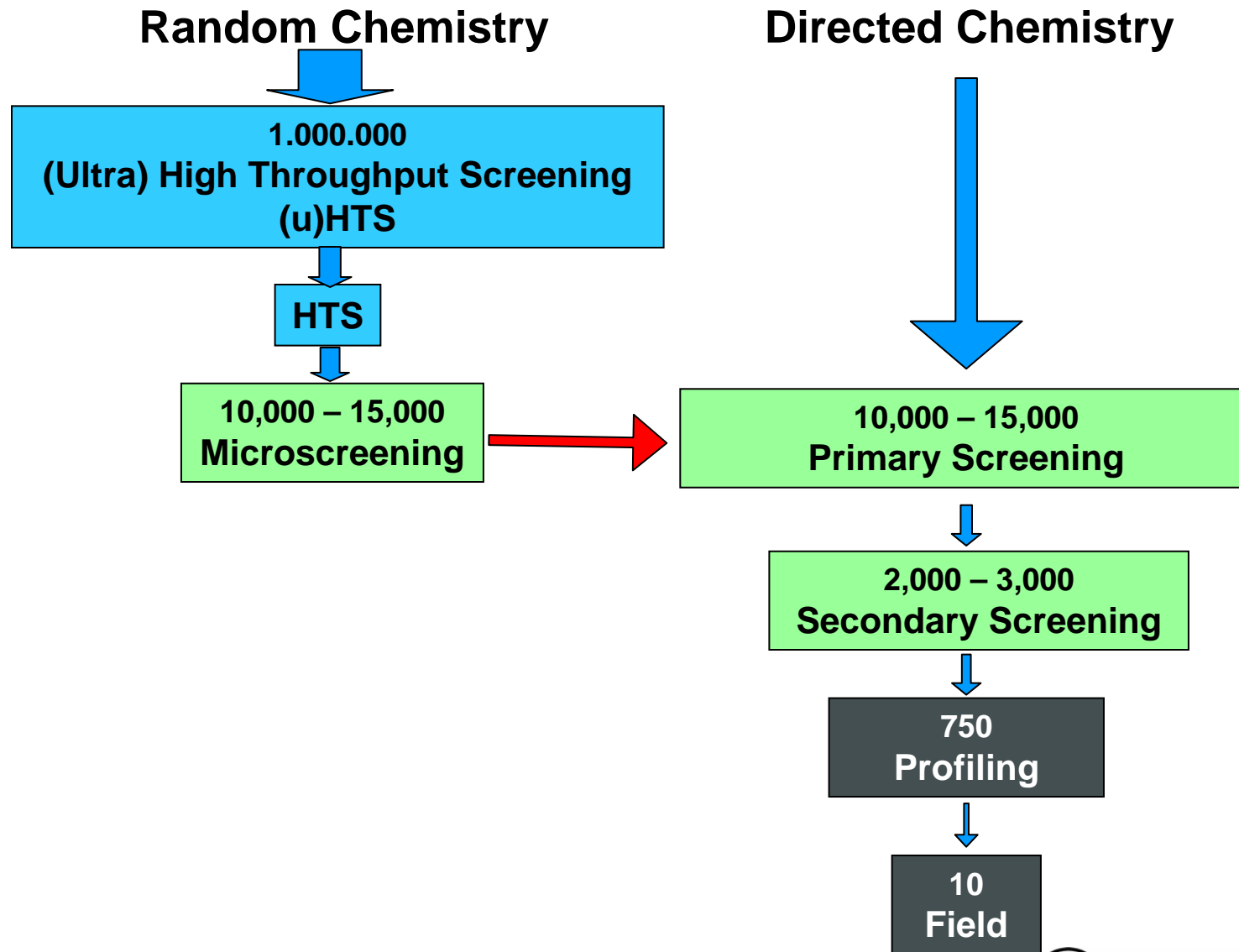
# Industry Leadership in Action Luck and Science

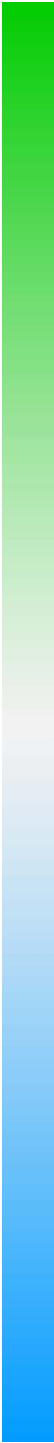
The number of compounds Bayer CropScience screens per year to discover just one or two new commercial products



# Screening for Biological Activity

## From 1 million to 10



A vertical bar on the left side of the slide, transitioning from green at the top to blue at the bottom.

What is the current cost of  
developing a new  
agrochemical product?



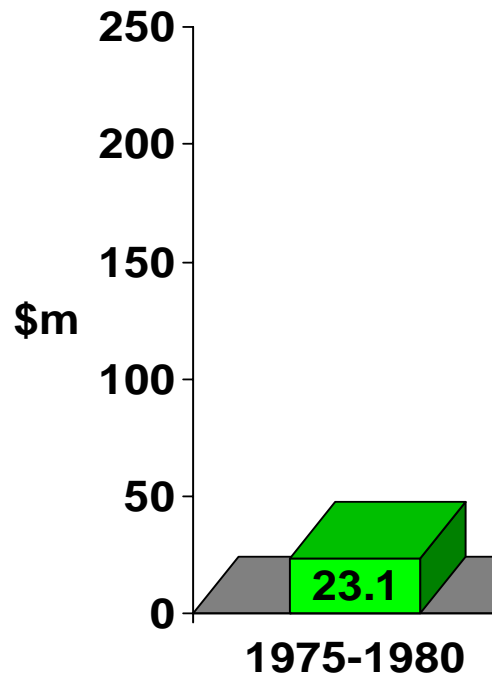
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# Industry Leadership in Action

## Commitment, Risk, Funding

Phillips McDougall for American Crop Life / European Crop Protection Association

### *Development costs*



(Aventis, BASF, Bayer, Uniroyal, Dow, DuPont, FMC, Monsanto, Sumitomo, Syngenta)



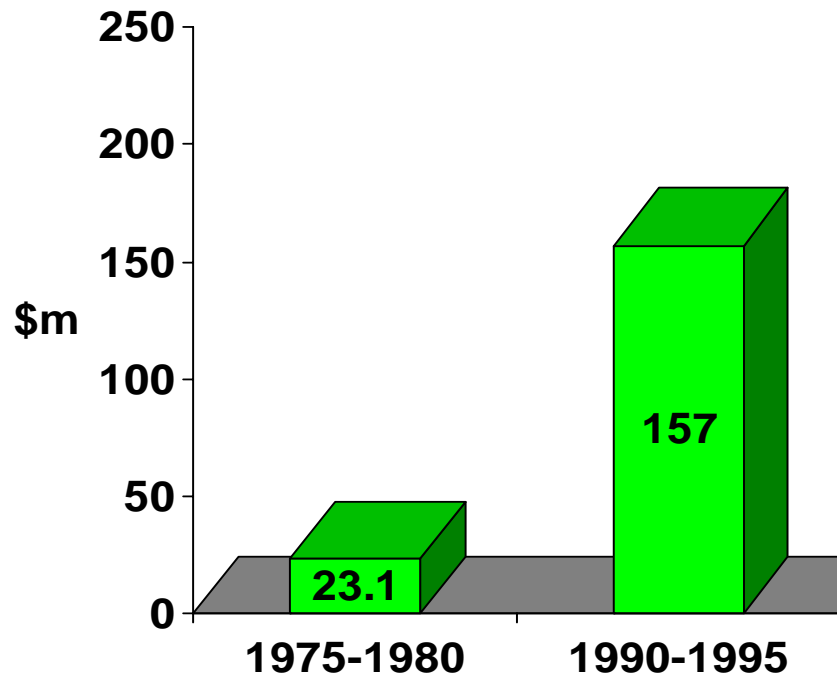
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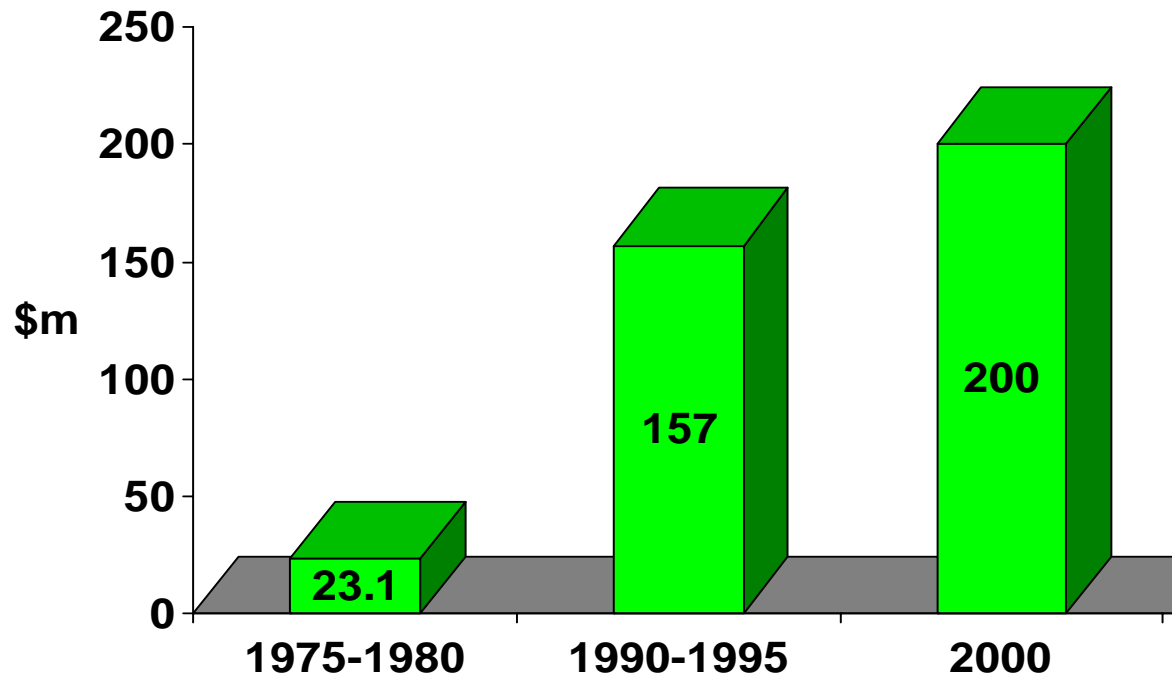
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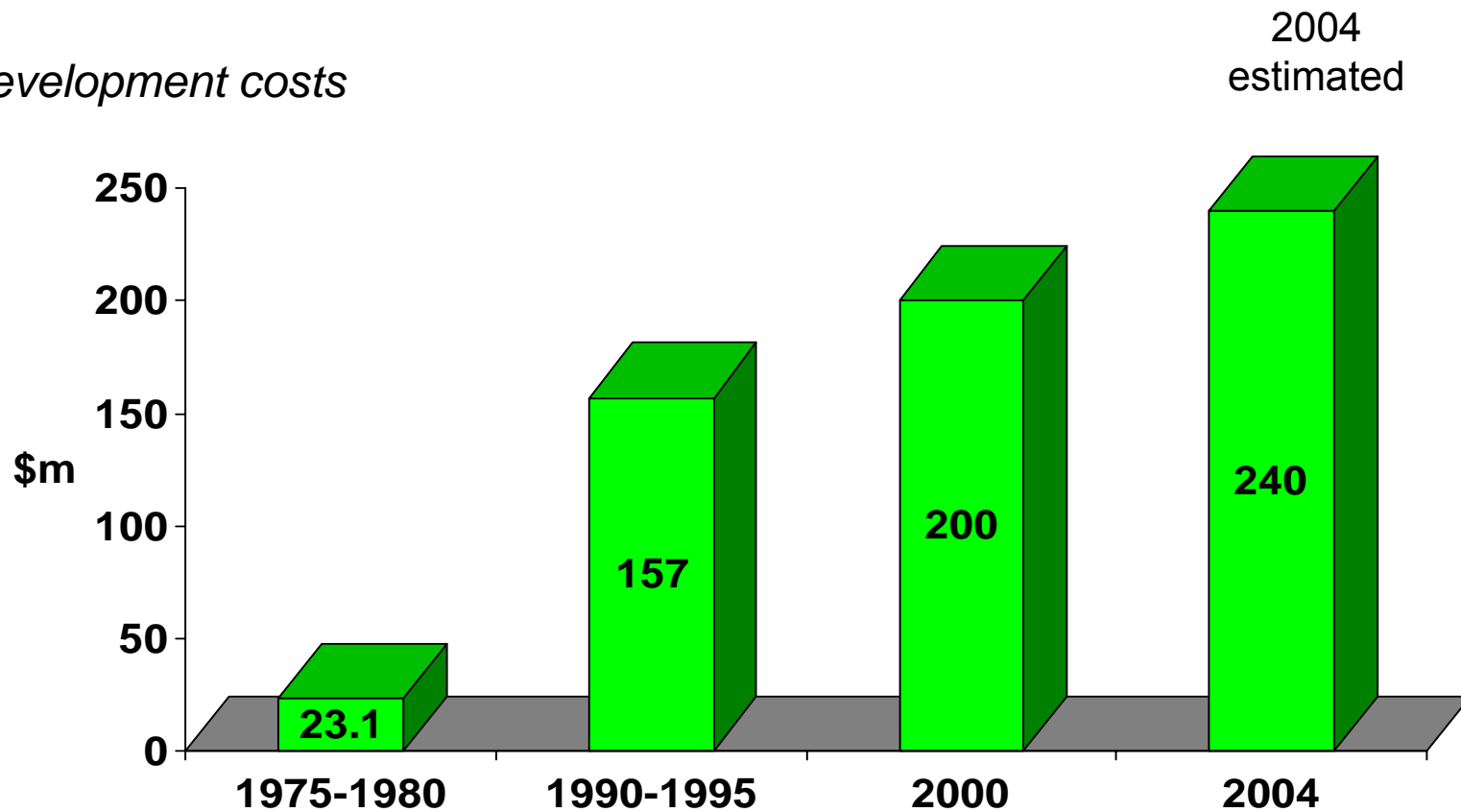


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# Industry Leadership in Action Commitment, Risk, Funding

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# A word or two about Patents

- ◆ US patents filed before 8.6.95 have 20 years from application or 17 years from grant, whichever is the longer
- ◆ 9 – 11 years from discovery to market
- ◆ <11 years to recoup the investment before generics enter



*'You're in luck—I've just invented patents.'*



# Industry Leadership in Action

New active ingredient discovery and development is a costly, time consuming, complex, highly competitive and uncertain business....

*....and only the best survive*

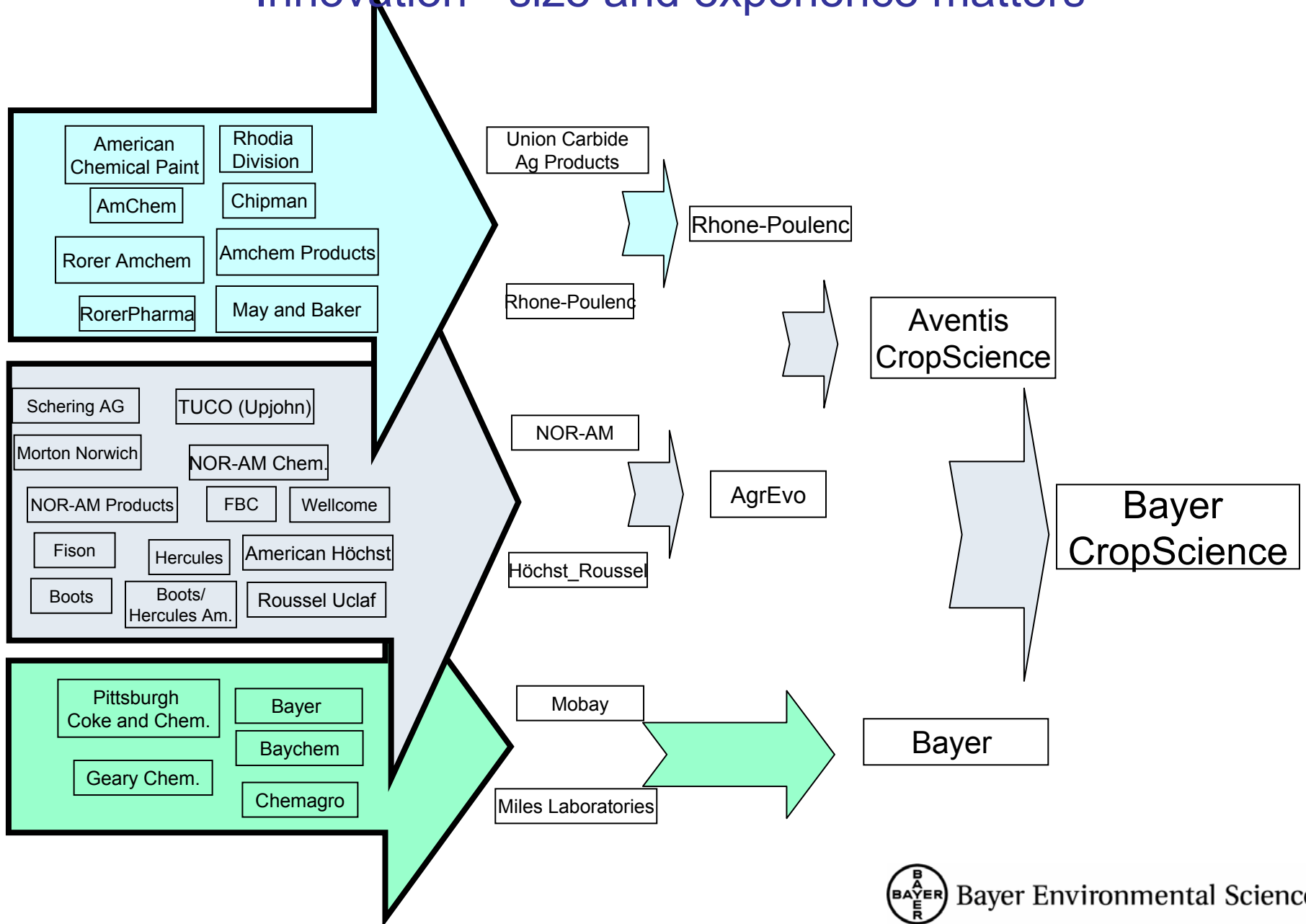


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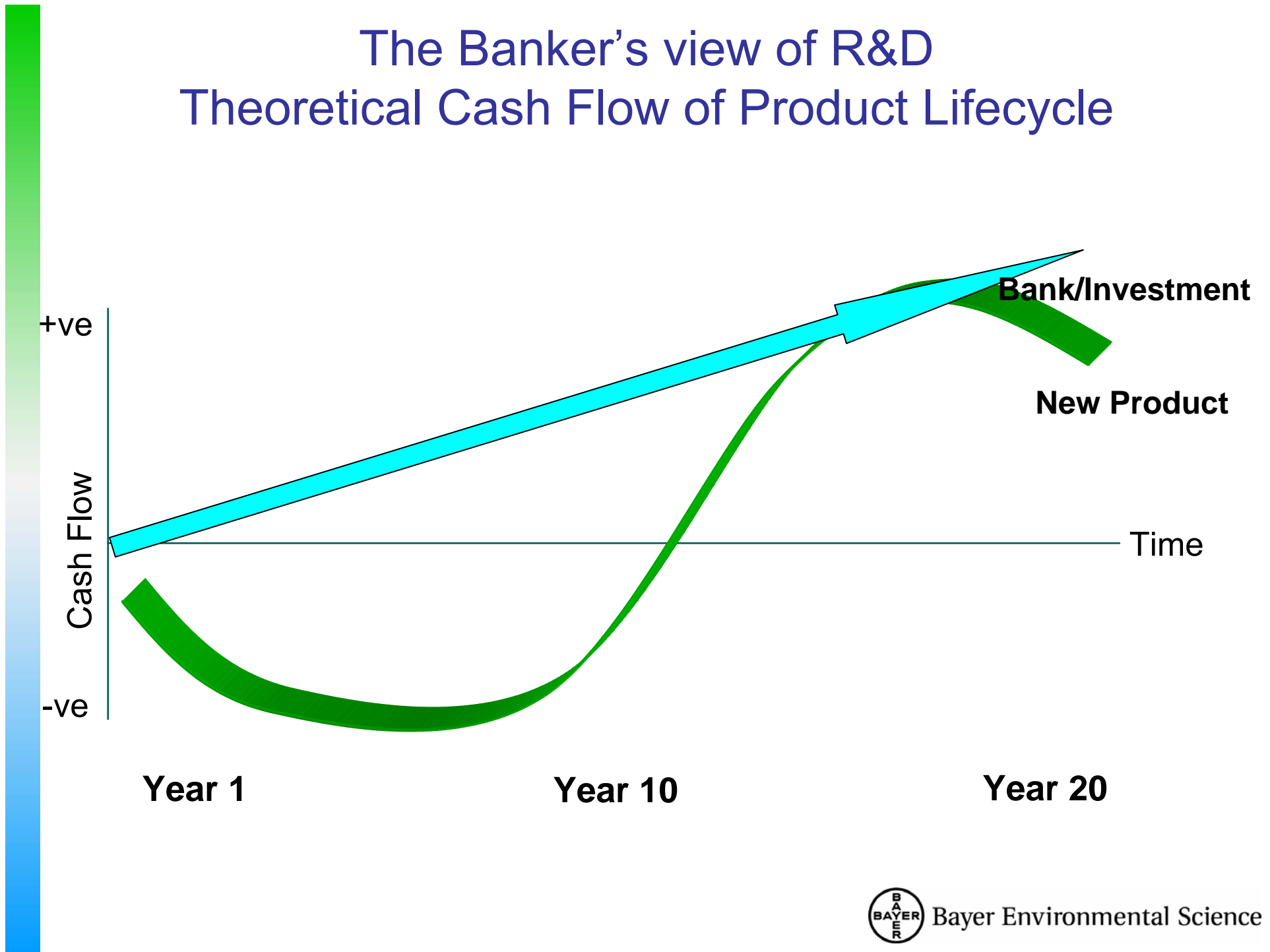
# Industry Leadership in Action

## Innovation - size and experience matters



# The Banker's view of R&D

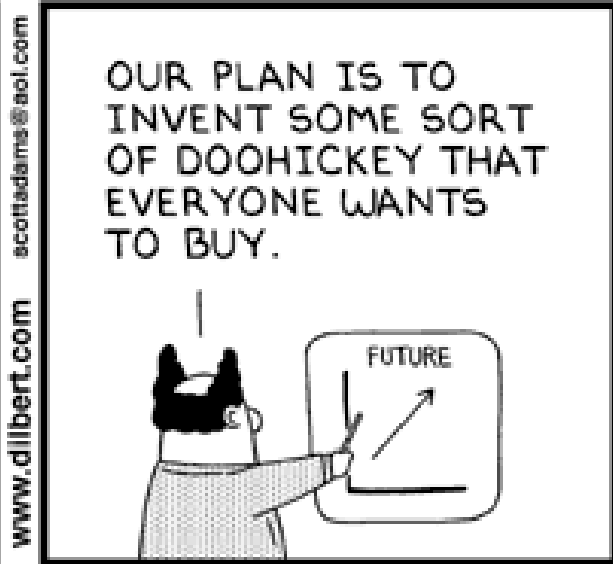
## Theoretical Cash Flow of Product Lifecycle



# Basic Manufacturer Consolidation

Position	1990	1995	2000	2005
	Ciba Geigy	Ciba Geigy	Syngenta	Syngenta
	ICI	Zeneca	Monsanto	Bayer CS
	Bayer	AgrEvo	Aventis CS	Monsanto
	Rhône Poulenc	DuPont	DuPont	DuPont
	DuPont	Bayer	BASF+AC	BASF
	Monsanto	Monsanto	Bayer	Dow R&H
	Dow Elanco	Am. Cyanamid	Dow	
	Hoechst/Roussel	Rhône Poulenc		
	BASF	Dow Elanco		
	Sandoz	BASF		
	Schering	Sandoz		
	Am. Cyanamid			
	Shell			

# Managing Innovation!



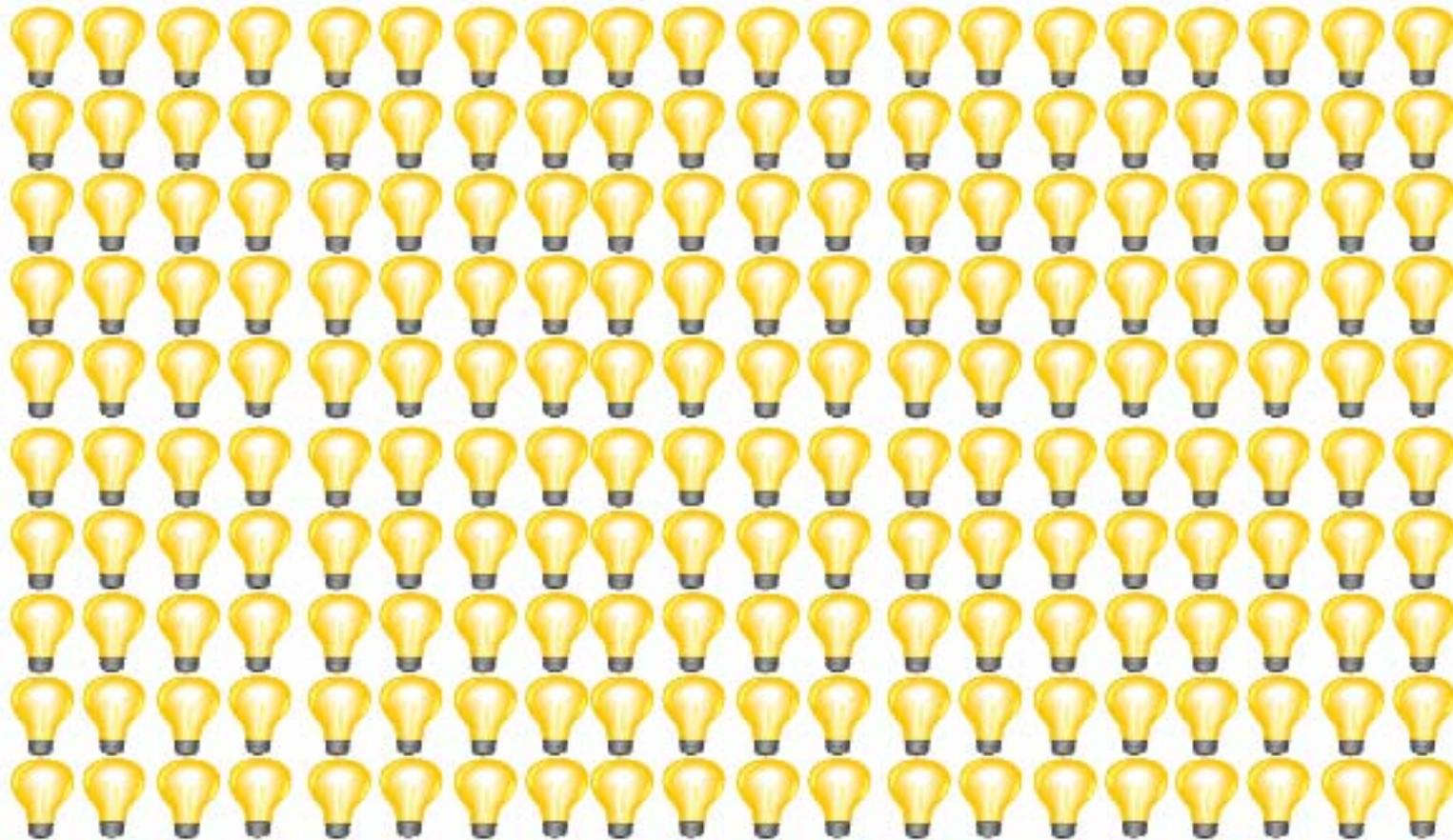
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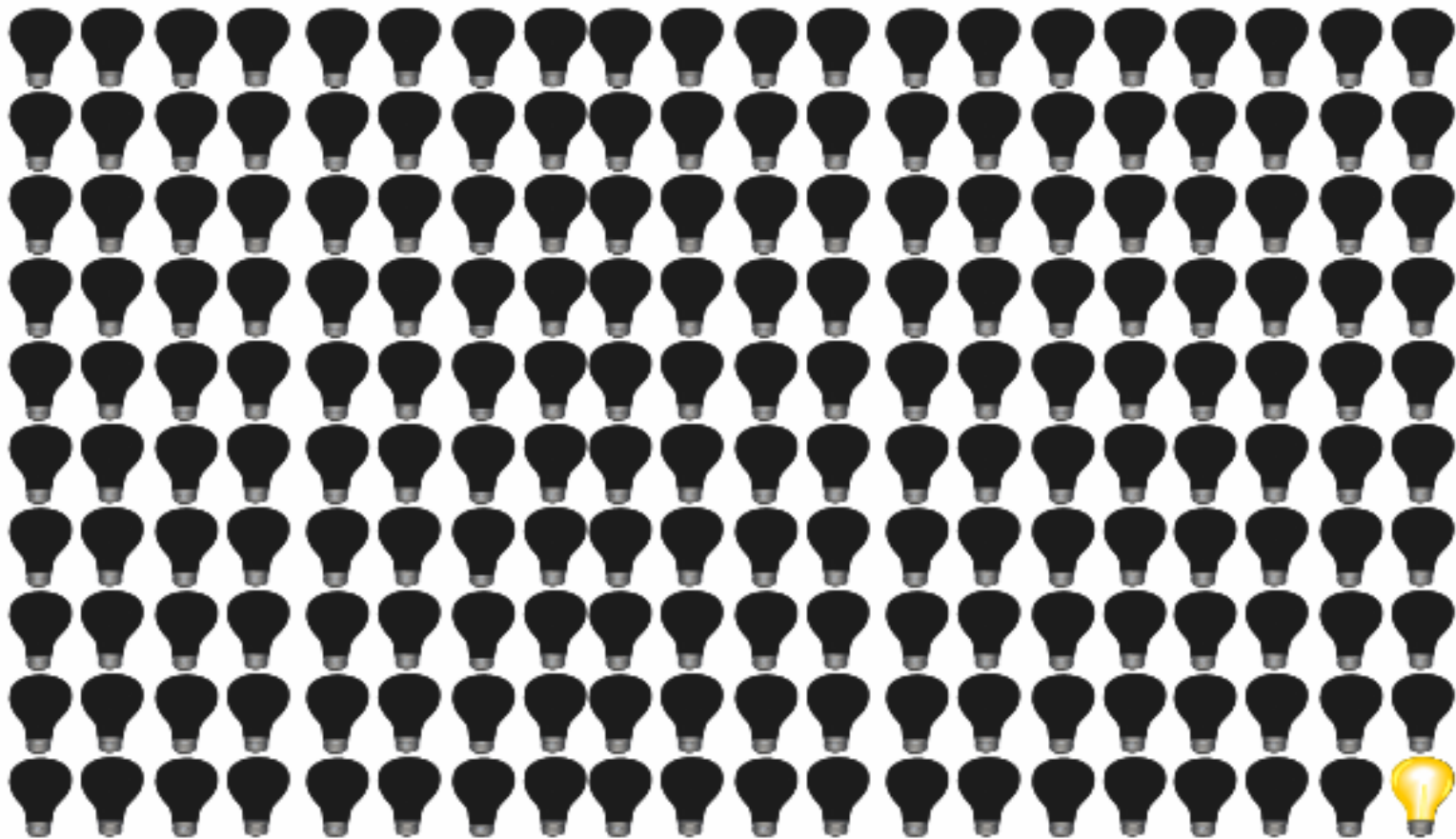
## How often does innovation succeed?

How many of 200 new product and design ideas are successful on the market?



How often does innovation succeed?

... one!





# Industry Leadership in Action Partnering with Academia

**The vitality of Urban Entomology programs is critical to advances in the pest management industry:**

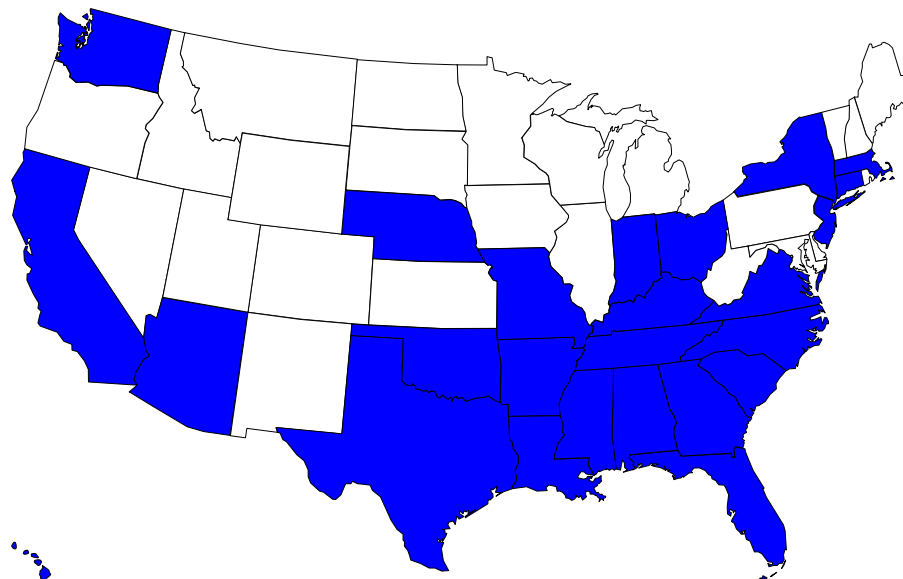
- ◆ Pioneering research
- ◆ Continuing education
- ◆ Undergraduate training

**Industry sponsorship insures survival of leading centers**

- ◆ State support is too variable

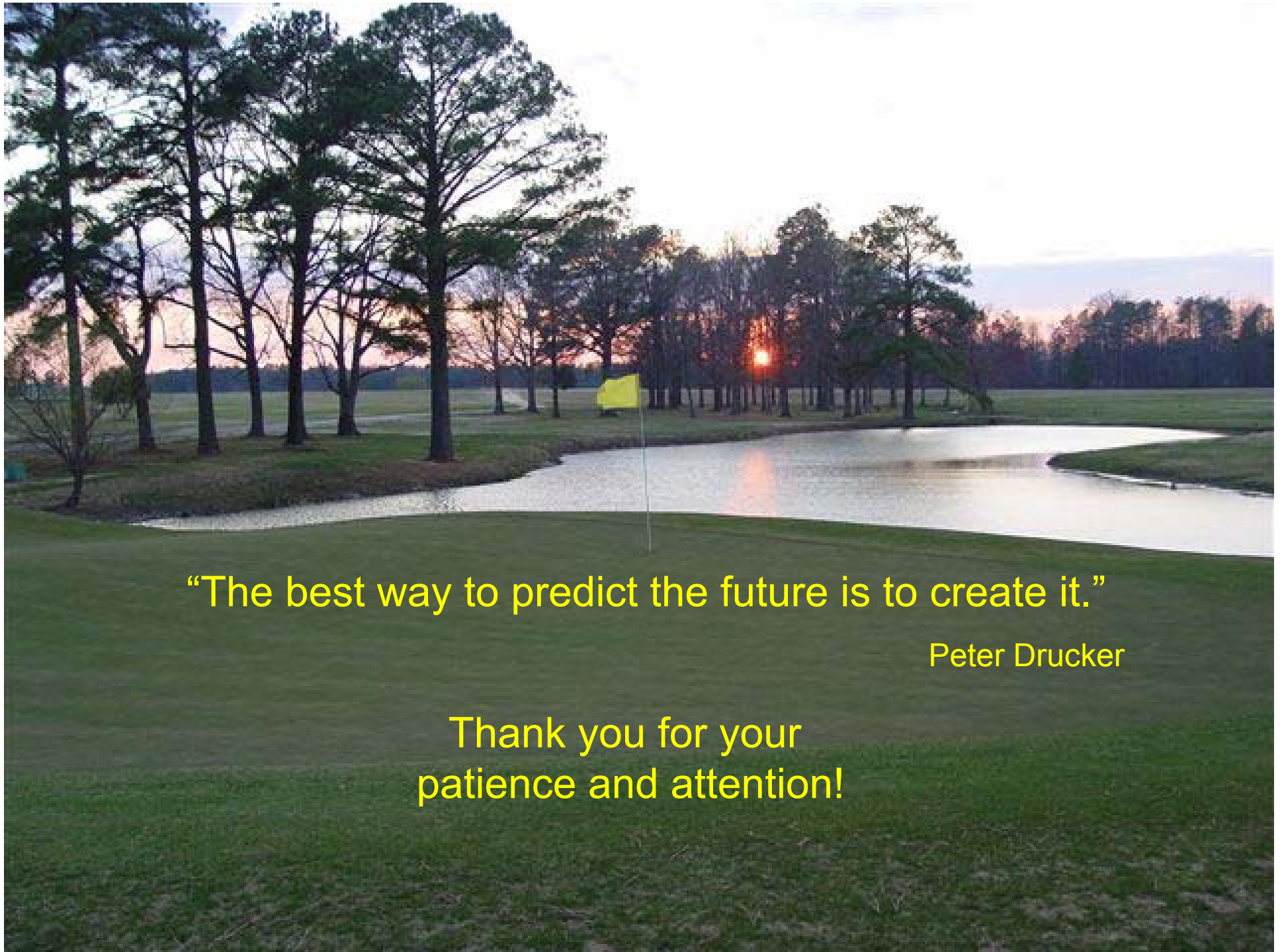
**Bayer's commitment to these programs is unrivaled**

- ◆ In past 4 years
- ◆ > \$6,000,000
- ◆ to 36 faculty
- ◆ at 28 institutions



*States where Bayer supports Urban Entomology research  
FY2003 to FY2006*





“The best way to predict the future is to create it.”

Peter Drucker

Thank you for your  
patience and attention!