

Presented at the CCR workshop,  
*“Precompetitive Collaborations: Enabling Technologies  
for the Pharmaceutical Industry”*

*June 12-13, 2013  
University of Pennsylvania Campus*

**The opinions and questions posed in this  
presentation are not those of the National Science  
Foundation.**

# "Role of Academia in Pre-Competitive Technology Development"

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June 13, 2013

# UC Davis is a Land Grant University

*\$684M in annual research funding,*

*Ranks 6th among US universities based on contributions to society (Washington Monthly)*

*10th in research funding among public universities (National Science Foundation)*

*16th among public universities nationwide (National Research Council).*



# *fully* **ENGAGED**

UC DAVIS

A NEWSLETTER FROM UNIVERSITY OUTREACH AND INTERNATIONAL PROGRAMS

*Led Carnegie Classification 2009 - 2011:*

School of Medicine

School of Law

Graduate School of Management

Betty Irene Moore School of Nursing

School of Veterinary Medicine

College of Agriculture and Environmental Science

College of Biological Sciences

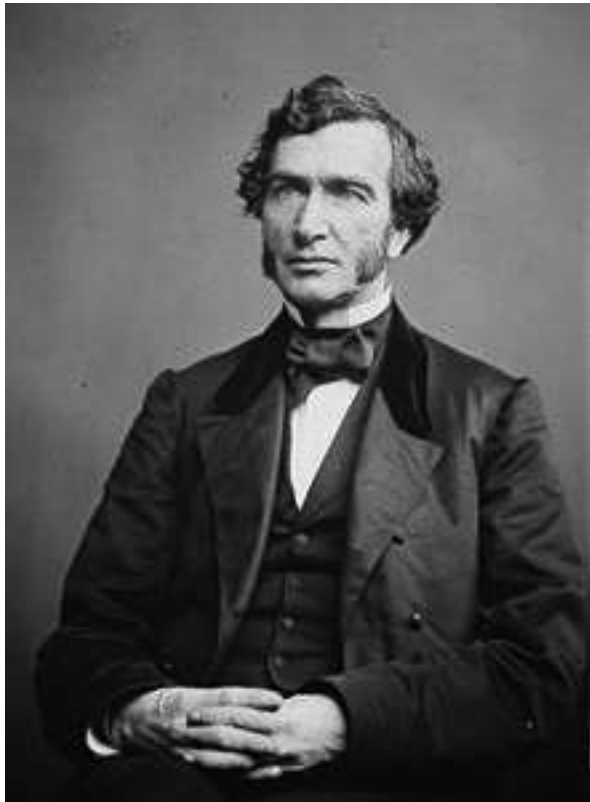
College of Engineering

College of Letters and Science



*William Lacy, Vice Provost (left)  
and Jacquelyn Gervay Hague,  
Associate Vice Provost*

## Justin Smith Morrill – A Congressman from Vermont



*To teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life (Morrill Act, 1862: section 4).*

## Land-grant Universities Established in 1862

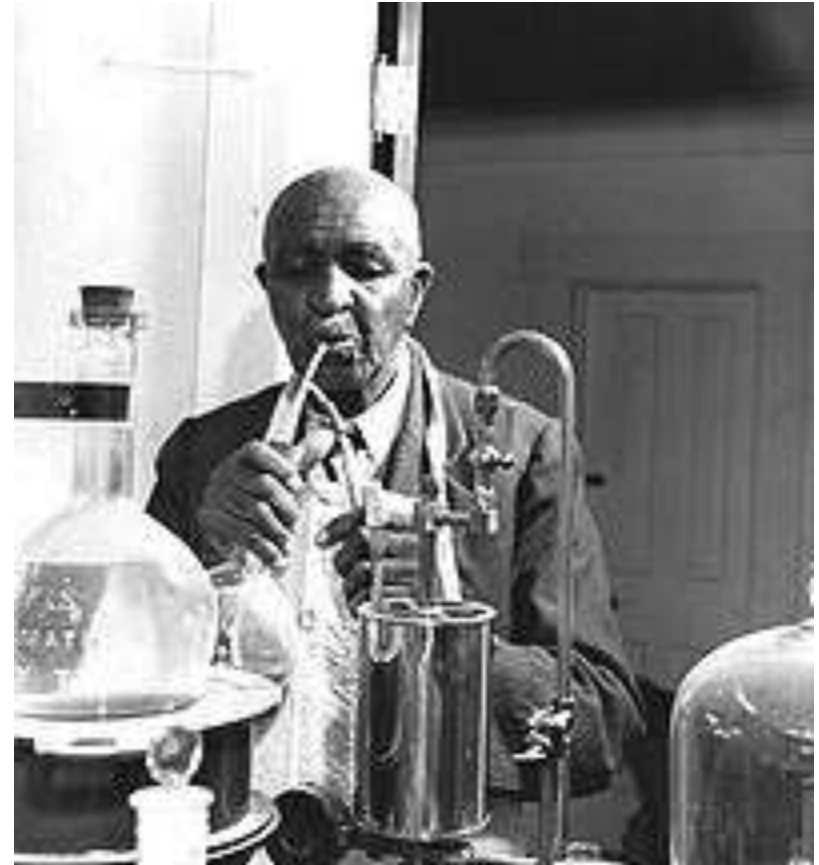


1862 – Morrill Act was signed by Abraham Lincoln which allowed the federal government to grant land to each state to establish an institution of learning.

## Hatch Act of 1887 Established Experimental Station

- The Hatch Act of 1887 provides the basis for Federal funding for agricultural research activities at the State Agricultural Experiment Stations in the 50 States, the District of Columbia, and the Insular Areas.
- Government saw our country's knowledge concerning agriculture as lacking and thus a direct cause of these failings in our agriculture industry.
- Supports any research deemed directly related to and beneficial for the United States agriculture industry.
- Promotion of **efficient production**, distribution, marketing, and **use of products and or methods that promote a prosperous agriculture industry and thus national prosperity**

# 1890 Morrill Act II Provided Agricultural Education to African Americans







## Establishes Experimental Station 1903

- A transformation of DuPont from an explosives company to a chemical and materials company.
- A primary goal was/is to increase food production and transport.
  - Neoprene – synthetic rubber 1920's
  - Nylon – synthetic fiber 1930's

*...turning science into products*

## 99 Years Ago Cooperative Extension Began

- Smith-Lever act of 1914 - Established a joint effort between the **USDA** and **land-grant institutions** in each state. Funding for county-level participation was also provided.
- *In 2012, NIFA has appropriated \$169M to support original and other researches, investigations, and experiments bearing directly on and contributing to the establishment and maintenance of a permanent and effective **agricultural industry** of the United States, including researches basic to the problems of agriculture in its broadest aspects, and such investigations as have for their purpose the development and improvement of the **rural home and rural life** and the **maximum contribution by agriculture to the welfare of the consumer.***

# Agriculture and Natural Resources (ANR) University of California

- **200 locally based Cooperative Extension advisors and specialists**
- **57 local offices throughout California**
- **130 campus-based Cooperative Extension specialists**
- **9 Research and Extension Centers**
- **6 statewide programs**
- **700 academic researchers in 40 departments at 3 colleges and 1 professional school:**
  - UC Berkeley College of Natural Resources
  - UC Davis College of Agricultural and Environmental Sciences
  - UC Davis School of Veterinary Medicine
  - UC Riverside College of Natural and Agricultural Sciences

# The Role of Academia in Cooperative Extension

- For more than a century, UC scientists have been fanning out to communities across California, serving as problem-solvers, catalysts, collaborators, stewards and educators.
- These advisors live and work in the communities they serve. To many Californians they are the face of UC—providing expertise, visibility and a keen understanding of local issues.
- Building bridges between the people of California and their University.



## Cooperative Extension is Transforming... Health Education through Extension Model

- Today, occupational safety, substance abuse and chronic disease plague rural communities.
- College of Agriculture partner with Academic Health Centers – Medical, Dentistry, Veterinary.
  - University of Kentucky
  - UC Davis
  - University of Minnesota
  - Texas A&M

## Goals of AHC CSE Partnership

- To provide results of health research to community
- To educate and empower individuals and families to adopt health behaviors and lifestyles
- To build community capacity to improve health
- To educate consumers to make informed health choices.

## CSREES Becomes NIFA

- National Institute of Food and Agriculture: responds to quality-of-life problems such as:
  - Improving agricultural productivity
  - Creating new products
  - Protecting animal and plant health
  - Promoting sound human nutrition and health
  - Strengthening children, youth, and families
  - Revitalizing rural American communities

## NIFA – Biotechnology and Genomics

- Through national program leadership and competitive funding opportunities, NIFA provides support for research, education, and outreach in the development and use of biotechnology and genomics.
- Support involves:
  - promoting cutting-edge scientific research for development of beneficial new tools and products that seek new and better ways to sustain and improve agriculture,
  - to protect our environment
  - to generate new economic opportunities for agricultural communities.



# New Biology for the 21<sup>st</sup> Century

NRC report 2009 – Commissioned by NIH, DOE and NSF

- Recommends that a New Biology Initiative be put in place and charged with finding solutions to major societal needs:
  - sustainable food production
  - protection of the environment
  - renewable energy
  - improvement in human health.
- **Focused on those opportunities that cannot be addressed by any one subdiscipline or agency—opportunities that require integration across biology and with other sciences and engineering, and that are difficult to capitalize on within traditional institutional and funding structures.**

## Combined Capabilities of Universities, Industry and Government Required.

- For the New Biology to flourish interagency **co-leadership** of projects will be needed to a far greater extent than is the case today.
- This approach is **not simply a matter of funding.**
- The combined capabilities and expertise of numerous organizations are required **to address society's greatest challenges.**

## NRC report = Opportunities for Pre-competitive Information Technology

- Information is the fundamental currency of the New Biology.
- Solutions to the challenges of **standardization, exchange, storage, security, analysis, and visualization of biological information** will multiply the value of the research currently being supported across the federal government.
- Biological data are extraordinarily heterogeneous and **interrelating various bodies of data** is currently precluded by the lack of the necessary information infrastructure.
- It is critical that all researchers be able to **share and access each others' information in a common or fully interactive format**.
- The **productivity of biological research will increasingly depend on long-term, predictable support for a high-performance information infrastructure**.

# Role of Academia in Pre-Competitive Technology Development

- The role of the Academy is to **Create and Disseminate New Knowledge.**
- Transformative Potential of Education
  - Enhance economic productivity
  - Inform the community
  - Improved quality of life
- Build Long-term Partnerships with Industry to **Develop Tools to Turn Science into Products and Solutions.**

# Agricultural Extension has Led to Enormous Efficiencies

Zhou Dynasty 11<sup>th</sup> Century BC

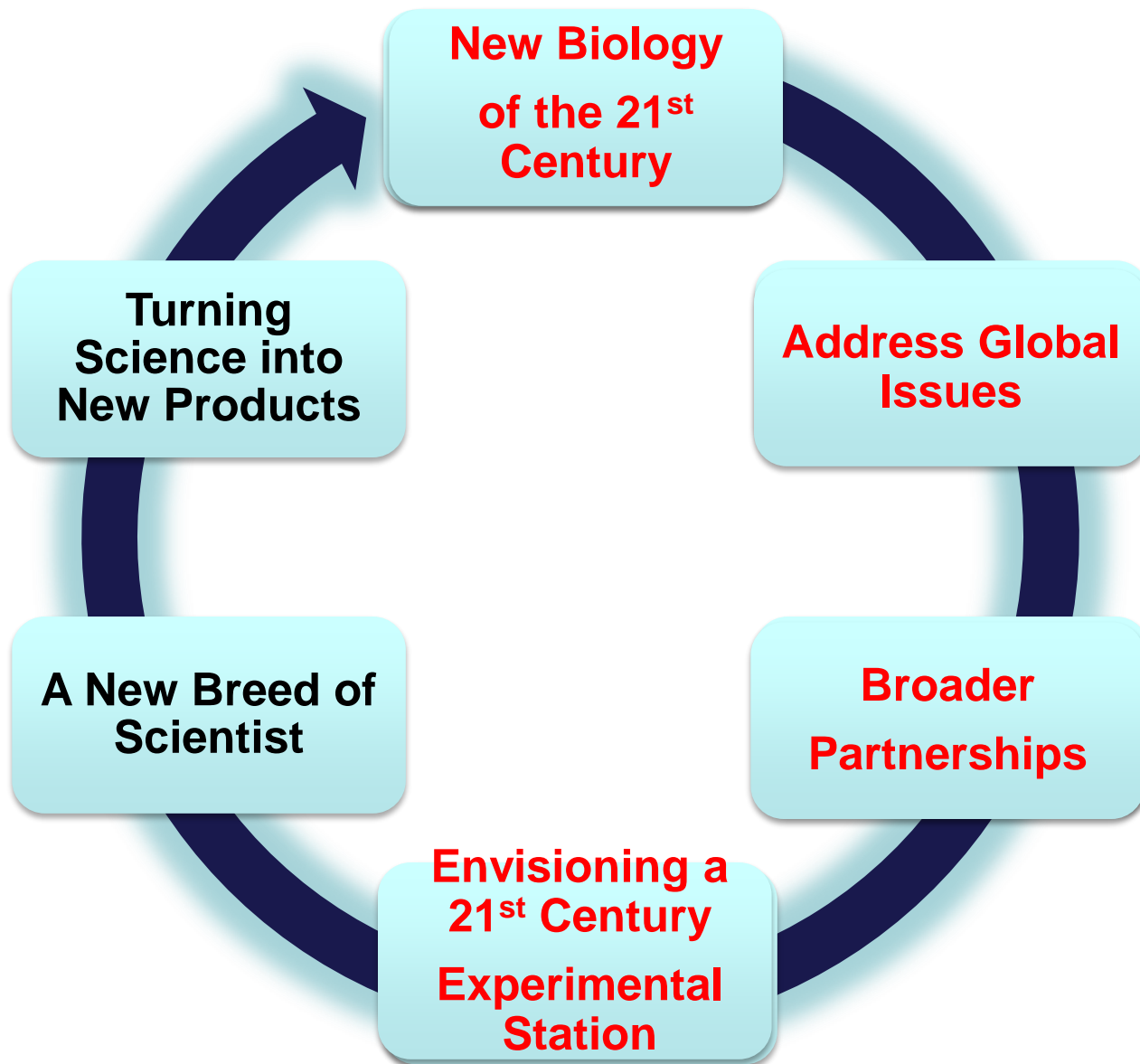


Planter Tractor

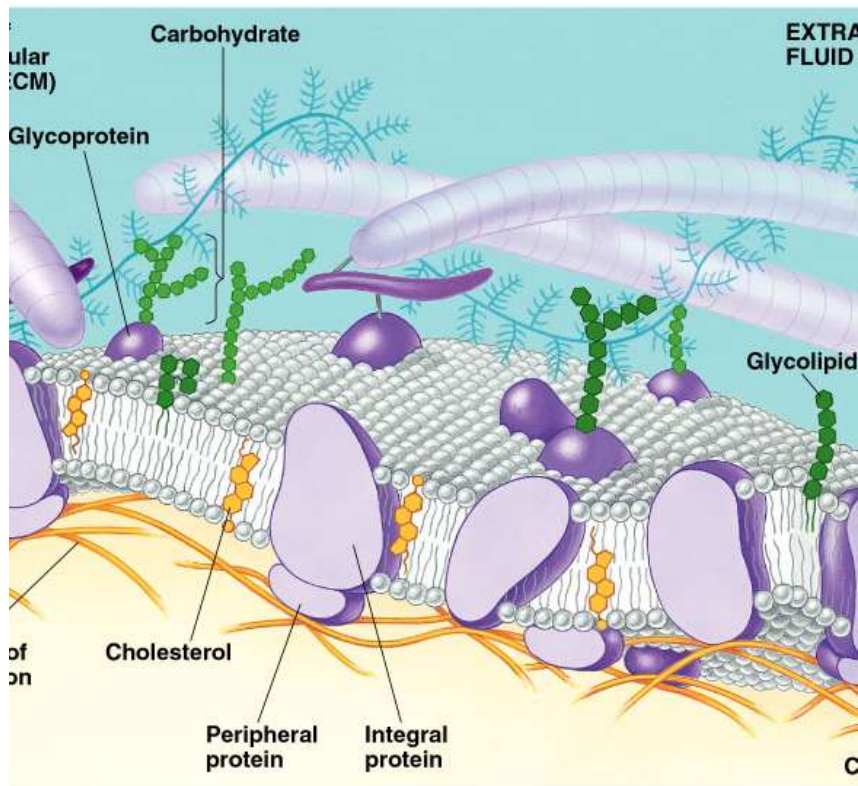


Iron and bronze tools  
Crop rotations

# Cooperative Extension as a Model Platform for Pre-competitive Technology



# Industry, Academic and Govt. Partnerships to Bridge Knowledge Gaps



Education, Inc., publishing as Benjamin Cummings.



# Pharma is the Farm

## Planter Tractor



Can we build a 21<sup>st</sup>  
Century Cooperative  
Extension Paradigm in  
the Pharma Space?

What will be our Planter  
Tractor?

- LOTF?