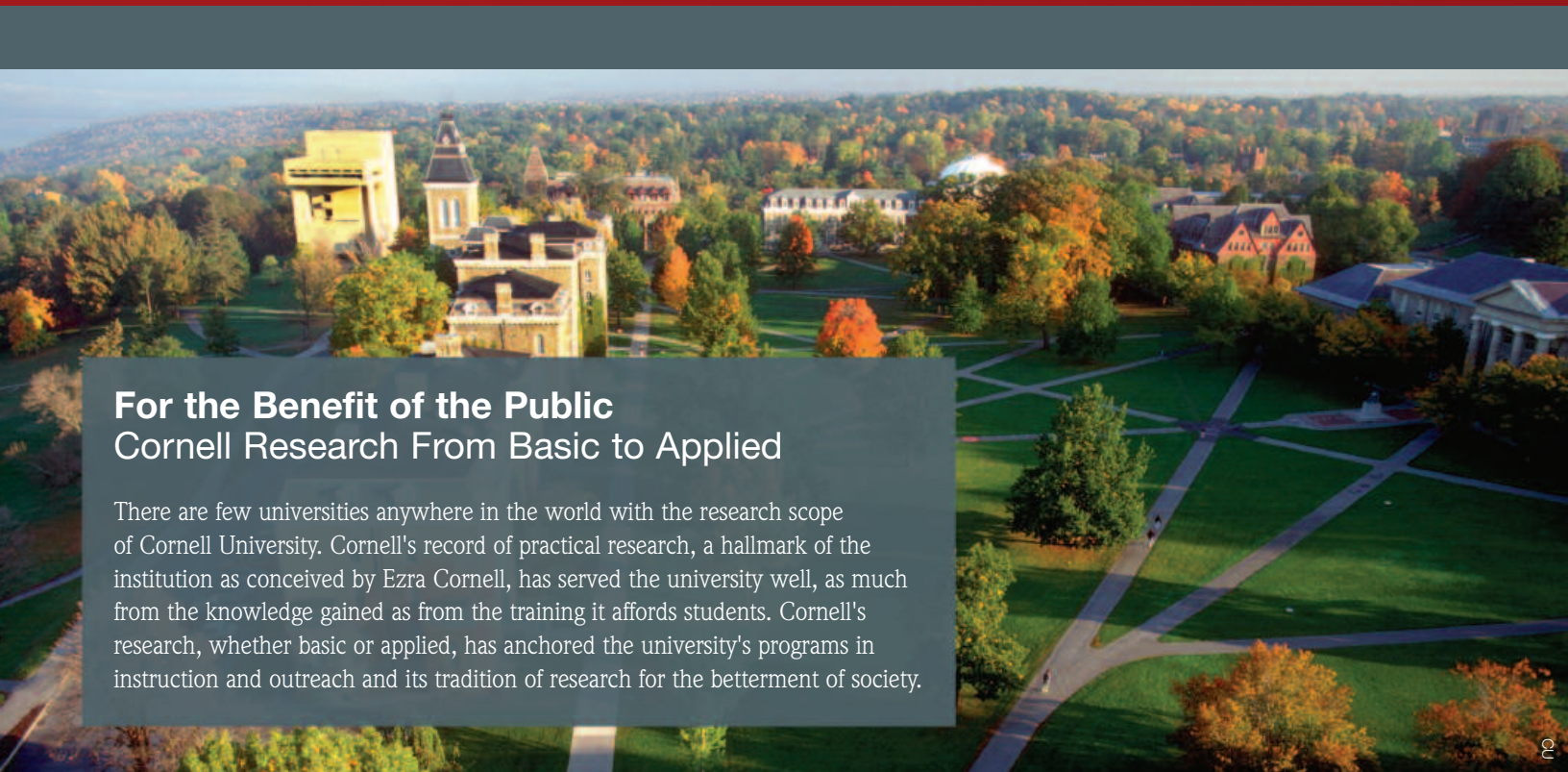


# CONNECTING WITH CORNELL

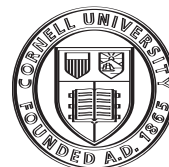
[ NEWS from the Office of the Vice Provost for Research ]



## For the Benefit of the Public Cornell Research From Basic to Applied

There are few universities anywhere in the world with the research scope of Cornell University. Cornell's record of practical research, a hallmark of the institution as conceived by Ezra Cornell, has served the university well, as much from the knowledge gained as from the training it affords students. Cornell's research, whether basic or applied, has anchored the university's programs in instruction and outreach and its tradition of research for the betterment of society.

<b>08</b> ↓ Research In Progress Food Safety	<b>11</b> ↓ Research In Progress Mosquito-borne Diseases	<b>14</b> ↓ Research In Progress A New Enzyme: Phytase	<b>17</b> ↓ Research In Progress Sustainable Global Enterprise	<b>19</b> ↓ Research In Progress Fuel Cells	<b>23</b> ↓ Research In Progress High Energy Density Plasmas	<b>27</b> ↓ Research In Progress Aging
<b>30</b> ↓ Research In Progress Innovative Thought	<b>36</b> ↓ Undergraduate Research Challenges in the Nation's Capitol	<b>40</b> ↓ Center Spectrum	<b>44</b> ↓ Outreach The University as Citizen	<b>52</b> ↓ Lecture Review Leveraging Talent: Public Service	<b>56</b> ↓ Research Newly Funded	<b>60</b> ↓ Conference Review Engineering in the Life Sciences
<b>64</b> ↓ Commentary The House Science Committee	<b>68</b> ↓ Technology Transfer Fuel Cell Technology	<b>72</b> ↓ Economic Development Re-Markable Paint Company	<b>74</b> ↓ Research In Focus Yielding Practical Benefits			



Cornell University

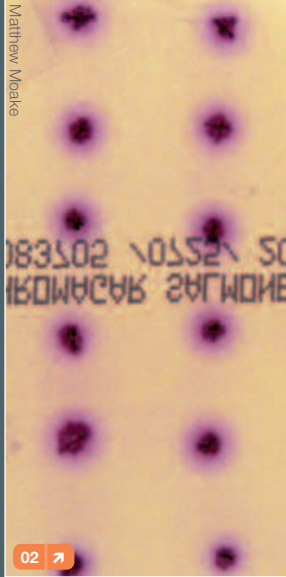
# For the Benefit of the Public

## Cornell Research From Basic to Applied

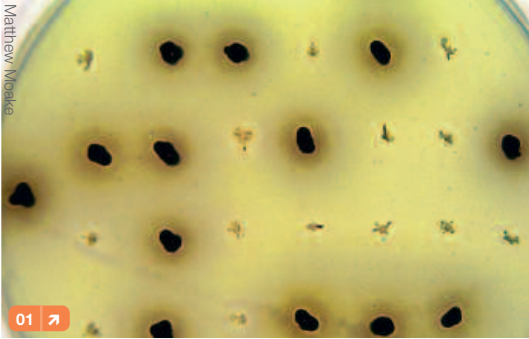
### Health

- ⌕ Food Safety
- ⌕ Mosquito-borne Diseases

Matthew Moake



02 ↗



Matthew Moake

01 ↗



Mike Sardalis - USAMRIID

03 ↗

### Aging

**CITRA** Cornell Institute for Translational Research on Aging

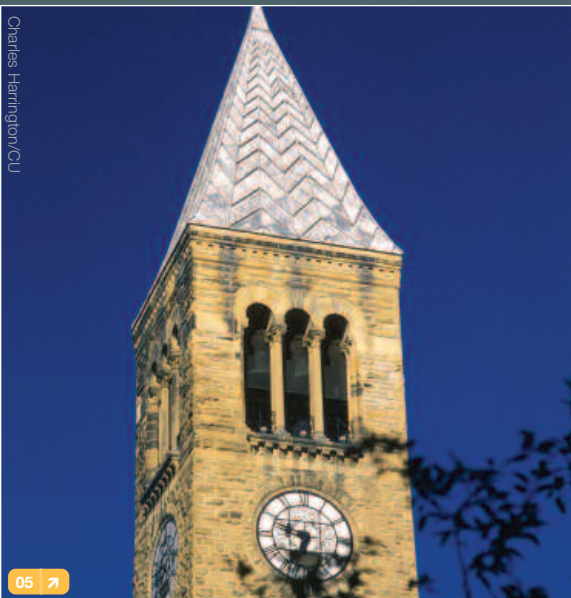


PSG

04 ↗

### The Environment

- ⌕ A new enzyme, phytase, invented at Cornell to supplement animal diets
- ⌕ Global Enterprise



Charles Harrington/CU

05 ↗



Charles Harrington/CU

06 ↗





07 ↗



08 ↗



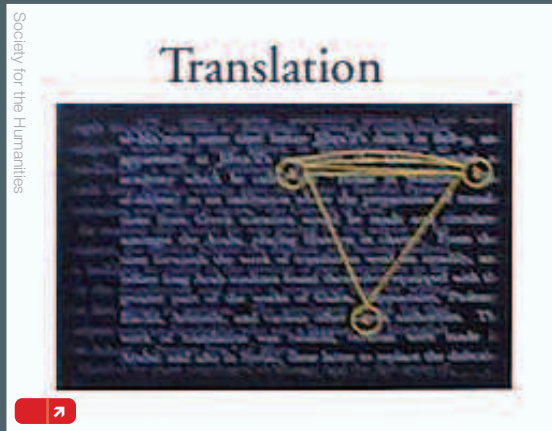
09 ↗

## Energy

- ⊕ Fuel Cell Development
- ⊕ Pulsed-Power-Driven High Energy Density Plasmas



10 ↗



↗

## Innovative Humanistic Thought

- 01. Bacterial pathogen identification from food samples
- 02. Bacterial pathogen identification from food samples
- 03. *Ochlerotatus japonicus*, a vector of West Nile Virus

- 04. Graduate student Neerja Vasishtha, City and Regional Planning, does public service work with seniors at the Housing Department of the New York Society for the Deaf.
- 05. Cornell's McGraw Tower

- 06. The Johnson Graduate School of Management
- 07. Scrap metal from a pulsed-power-driven high energy density plasma process
- 08. Solution of hexachloroplatinic acid used to make PtPb nanoparticles

- 09. Graduate student Jon Douglas constructs cylindrical array of 3 Tungsten 15 micron wires.
- 10. A.D. White House, home of the Society for the Humanities

# For the Benefit of the Public Cornell Research From Basic to Applied

all research could potentially benefit the public, and one can never anticipate what research will and what will not. sometimes the research does not become of practical importance until years later, or until a crisis occurs.

Cornell, as New York State's federal land-grant institution—not only the four state-assisted contract colleges—performs research of practical benefit and transfers it promptly to the public. Whether for upstate farms, disadvantaged schools, or inner city parks and vacant lots, Cornell not only disseminates its applied research for immediate benefit but also translates its basic research for practical applications. This is at the core of its mission.

Compared to peers in the Ivy League, Cornell has the only agriculture, hotel, and human ecology colleges, and one of only two veterinary colleges. Unlike most veterinary colleges, Cornell's college is heavily research-based. Cornell is one of only two American universities that have two agricultural experiment stations.

**cornell's record of practical research is a hallmark of the university as conceived by ezra cornell.**

A highly interdisciplinary culture at Cornell ensures the integration of research programs in the life, physical, engineering, and computational sciences. Such integration is increasingly critical to the discovery of new knowledge and to the solutions for many practical problems.

These disciplines at Cornell are unusually high in quality. The National Research Council's rankings placed Cornell's programs in organismic biology, physics, chemistry, engineering, and computer science in the top 10 nationally. Few universities have such excellence across so broad a spectrum. Graduate students and postdoctoral fellows are among the best, and undergraduates, often an integral part of Cornell's research programs, are outstanding. According to the National Science Foundation, Cornell ranks third overall in the number of undergraduates who get Ph.D.s in science and engineering. This is the base on which Cornell's research in the public interest rests. It is comprehensive, interdisciplinary, and of high intellectual quality.

As this issue of *Connecting with Cornell* focuses on research that benefits the public, let us point out that all research could potentially benefit the public, and one can never anticipate what research will and what will not. Sometimes the research does not become of practical importance until years later or until a crisis occurs. How could it have been known a few years ago, for example, that research on the basic natural history, behavior, and ecology of white-footed mice would be so important, until they were identified as the vector of transmission for hantavirus, which caused human fatalities in several Western states? Suddenly, the research results, gathered over several decades by many individuals including some faculty at Cornell, became critical to controlling the further spread of the virus.

Some research, however, has more obvious and immediate practical benefit, such as the faculty research highlighted in this issue. This eclectic group of faculty come from five Cornell colleges, the Agricultural Experiment Station at Geneva, and five Cornell research centers across campus. They conduct research on health, energy, the environment, and human well-being. This issue of *Connecting With Cornell* focuses on just a few of the Cornell faculty's many contributions of interest to the public. Although these faculty research projects were selected, any number of other examples of faculty research would have demonstrated Cornell's contributions to the public interest equally as well.

Randy Worobo, Food Science and Technology, and his associates at Cornell's Geneva Experiment Station conduct research to improve the safety and shelf life of human foods. There are still significant problems, such as heat-resistant microbes that withstand pasteurization. Worobo's team, which includes many Cornell graduates, conducts research on potential pathogens, such as a special form of *Escherichia coli*, the common human gut bacterium, and Salmonella, to find new ways to sanitize surfaces. They have also discovered alternatives to thermal pasteurization, using exposure to ultraviolet light or naturally produced compounds that inhibit pathogenic organisms.

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successful outreach, however, is based on solid research results.

Xingen Lei, Animal Science, on the Ithaca campus, studies the biology of enzymes—those protein molecules that catalyze very specific reactions in organisms. Lei and his team study an enzyme (phytase) that allows animals to extract phosphorus from feed. Reducing the amount of phosphorus in animal manure is significant because excess phosphorus can have a major detrimental environmental impact. Currently, farmers supplement the diets of swine, chickens, and calves with a commercial phytase, but Lei's group has developed a new form of phytase from bacteria that is three to four times more effective. To make this new phytase available in a form that animals can consume is a complicated process, and this is now the current focus of Lei's group.

research into the mitigation of the aging process in humans; the role of the many faculty associated with Cornell's Society for the Humanities in researching the social, ethical, and intellectual contexts of human society, with an emphasis on interdisciplinary exchanges; Laura Harrington's research in the Department of Entomology on West Nile virus, a mosquito-borne disease that was first discovered in the U.S. in 1999 and has already caused hundreds of human fatalities; and research headed by Stuart Hart in the Johnson Graduate School of Management that seeks to understand how modern business practices can achieve success by solving global, social, and environmental problems, such as the promotion of sustainability.

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To strengthen Cornell's outreach programs—interfacing research directly with the public—Stephen Hamilton, Human Development, was appointed last year to a newly created position, Associate Provost for Outreach. This appointment will help to better organize and consolidate Cornell's efforts in outreach, including the university's extension programs, resulting in greater public understanding of Cornell's research as well as direct public use.

Successful outreach, however, is based on solid research results. Thus, what happens on the Cornell campuses—Ithaca, Manhattan, Geneva, and at other research locations around the state and beyond—is fundamental.



Kraig Adler  
Neurobiology and Behavior  
Vice Provost for Life Sciences



Stephen Hamilton, Associate Provost for Outreach, continues Cornell's commitment to directly applying the university's research for the public's benefit.

Cornell faculty are leaders in the development of new techniques to reduce our dependence on fossil fuels, such as coal and oil, and the negative environmental impact of their use. One technology is the fuel cell, an old idea that has only recently been put into practice. The cells depend upon the energy released by combustion of hydrogen or other fuels. These

devices would become the basis of the "hydrogen economy" touted by the popular press, but many significant practical problems remain to be solved. Several Cornell teams are researching various features of fuel cells, including Héctor Abruña, Barry Carpenter, and Frank DiSalvo, Chemistry and Chemical Biology, and Emmanuel Giannelis, Bruce Van Dover, and Ulrich Wiesner, Materials Science and Engineering.

Other research highlighted includes studies by Bruce Kusse, Applied and Engineering Physics, using methods of pulsed power technology to develop new energy sources; work by Karl Pillemer, Human Development, and Mark Lachs in New York City at Weill Cornell's Department of Medicine, Geriatrics, that translates behavioral, social, and medical