

2004 **A DISTINCTIVE EDGE**
RESEARCH AT CORNELL

ANNUAL REPORT FY 2004

- ☰ [Home Page](#)
- ☰ [Reviewing the Year](#)
- ☰ [Selected Faculty Research](#)
- ☰ [Selected Books by Faculty](#)
- ☰ [More Notables](#)
- ☰ [Honors & Distinctions](#)
- ☰ [Transferring Technology](#)
- ☰ [Cornell Research Funding](#)
- ☰ [Centers & Colleges](#)

 [Print This Page](#)

From the Vice Provost for Research



Robert Richardson

Duffield Hall, the remarkable new facility for advanced engineering technology, became fully functional in October. The Mars mission continued to produce important new results. The Cassini mission to Saturn returned spectacularly beautiful photographs and significant data about the satellites of Saturn. Cornell's research funding continued its steady growth, tracking the pattern of federal support for research. The vitality of our research enterprise is apparent.

We are concerned, however, about issues that plague university research. Regulations on the management of university-based research are becoming increasingly stringent. In addition, a downturn in the size of the national research budget is certain. In response to these issues, Cornell has taken essential actions.

[> Top](#) / [> Read More](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Reviewing the Year

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

This has been a year of distinction for Cornell researchers.



Robert Richardson

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data about the satellites of Saturn. Cornell's research funding continued its steady growth, tracking the pattern of federal support for research. The vitality of our research enterprise is apparent.

We are concerned, however, about issues that plague university research. Regulations on the management of university-based research are becoming increasingly stringent. In addition, a downturn in the size of the national research budget is certain.

In response to these issues, Cornell has taken essential actions. To accommodate the increased reporting requirements for compliance with the many federal and state regulations, we have established a new office—the Office of Research Integrity Assurance (ORIA). The staff of ORIA will support Cornell faculty in conducting the required reviews of such matters as the conduct of human research, the appropriate treatment of animals, mandated training in specific research practices, and issues related to the hosting of foreign national students and researchers. In the past, Cornell faculty volunteered the time required to comply with mandated reporting of research practices. The new ORIA will relieve many of the administrative burdens on the faculty.

Federal support of basic research seems destined to decrease over the next four years. The rapid growth of the National Institutes of Health funding has ended, and the more modest National Science Foundation budget will become even smaller. NASA will devote an increasingly larger fraction of its budget to manned space programs, which offers less opportunity for university research participation. Projections

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for the other federal agencies show decreases in their budgets, as well.

One strategy for coping with the decreased federal funding is to turn to other sources. Less than 8 percent of Cornell's research is supported by nongovernmental sources. More Cornell faculty and students could benefit from stronger ties to the industrial sector. In order to be more effective in developing relationships with potential corporate sponsors of research, we have reorganized our technology transfer office. The former Cornell Research Foundation has been incorporated into a new organization, the Cornell Center for Technology, Enterprise, and Commercialization ([CCTEC](#)). In addition to marketing Cornell inventions and playing an active role in economic development, [CCTEC](#) will have the responsibility for increasing corporate sponsorship of Cornell research. Our goal is to double the fraction of privately sponsored research in the next decade.

*Robert C. Richardson
Vice Provost for Research*

[› Top](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

[01. Rural Road](#)

Josephine A. V. Allen and Eunice Rodriguez, Policy Analysis and Management

[02. Drinking and Gender Harassment](#)

Samuel Bacharach, Industrial and Labor Relations

[03. Hear the Humming?](#)

Andrew H. Bass, Neurobiology and Behavior

[04. Converting Nitrogen into Ammonia](#)

Paul Chirik, Chemistry and Chemical Biology

[05. Beyond Nano](#)

Harold G. Craighead, Applied and Engineering Physics

[06. Memory and Change](#)

Timothy J. DeVoogd, Psychology/Neurobiology and Behavior

[07. Jumping Species](#)

Edward J. Dubovi, Population Medicine and Diagnostic Sciences

[08. Class-Action Court](#)

Theodore Eisenberg, Law

[09. The Shape of a Protein](#)

Steven E. Ealick, Chemistry and Chemical Biology

[10. Corporate Finance](#)

Yaniv Grinstein, Johnson Graduate School of Management,

[11. Taking Iron Supplements](#)

Jere Haas, Nutritional Sciences

[12. Stand at Your Computer](#)

Alan Hedge, Design and Environmental Analysis

[13. Mysteries of Human Memory](#)

September 9, 2013
04:26:52 PM

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Barbara Hempstead, Weill Cornell Medical College,
Hematology/Oncology

14. Hotels During Blackouts

Robert Kwortnik, Hotel Administration

15. Selenium and Type 2 Diabetes

Xingen Lei, Animal Science

16. Photonic Chips

Michal Lipson, Electrical and Computer Engineering

17. Tunable Nanotube Oscillator

Paul L. McEuen, Physics

18. Debugging new Semiconductor Materials

David A. Muller, Applied and Engineering Physics

19. Food—Insecurity or Security?

Christine M. Olson, Nutritional Sciences

20. Upstate New York Economy

Rolf J. Pendall, Matthew P. Drennan, and Susan M.
Christopherson, City and Regional Planning

21. Mystery of The Crane Dance

Nerissa Russell, Anthropology

22. Secrets of Synaptic Activity

Timothy A. Ryan, Weill Cornell, Biochemistry/Biochemistry in
Anesthesiology

23. Switching Brands

Judy A. Siguaw, Hotel Administration

24. The Spirit of the Rovers

Steven W. Squyres, Astronomy

25. Celebrating Friends

Steven E. Stucky, Music

26. DNA Unzipped

Michelle D. Wang, Physics

27. Falling Paper, Falling Leaves

Z. Jane Wang, Theoretical and Applied Mechanics

28. Seeing Millisecond Nerve Impulses

Watt W. Webb, Applied and Engineering Physics

29. On the Trail of Influenza

Gary R. Whittaker, Virology

30. Imitating Nature

Ulrich B. Wiesner, Materials Science and Engineering

31. Rings and Moons

Joseph A. Burns, Theoretical and Applied
Mechanics/Astronomy

[› Top](#)

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[Design & Development](#) | *Last Updated:*



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

[01. N'Dri T. Assié-Lumumba, ed., Africana Studies and Research Center](#)

Cyberspace, Distance Learning, and Higher Education in Developing Countries: Old and Emergent Issues of Access, Pedagogy, and Knowledge Production (Brill, 2004)

[02. Lourdes Benería, City and Regional Planning/Women Studies](#)

Gender, Development, and Globalization: Economics As If All People Mattered (Routledge, 2003)

[03. Richard F. Bensele, Government](#)

The American Ballot Box in the Mid-Nineteenth Century (Cambridge University Press, 2004)

[04. Mabel M. Berezin, ed., Sociology, \(with Martin Schain\)](#)

Europe without Borders: Remapping Territory, Citizenship, and Identity in a Transnational Age (Johns Hopkins University Press, 2004)

[05. Karl Berkelman, Physics](#)

A Personal History of CESR and CLEO: The Cornell Electron Storage Ring and Its Main Particle Detector Facility (World Scientific Publishing Company, 2004)

[06. Urie Bronfenbrenner, ed., Human Development](#)

Making Human Beings Human: Bioecological Perspectives on Human Development (Sage Publications, 2005)

[07. Calum M. Carmichael, Comparative Literature/Law](#)

Ideas and the Man: Remembering David Daube (Vittorio Klostermann, 2004)

[08. Raymond B. Craib, History](#)

Cartographic Mexico: A History of State Fixations and Fugitive Landscapes (Duke University Press, 2004)

[09. Ronald G. Ehrenberg, ed., Labor and Industrial Relations/Economics](#)

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Governing Academia: Who Is in Charge at the Modern University? (Cornell University Press, 2004)

10. Stuart L. Hart, Johnson Graduate School of Management

Capitalism at the Crossroads: The Unlimited Business Opportunities in Solving the World's Most Difficult Problems (Wharton School Publishing, 2005)

11. Dominick C. LaCapra, History/Comparative Literature

History in Transit: Experience, Identity, Critical Theory (Cornell University Press, 2004)

12. Thomas A. Lyson, Development Sociology

Civic Agriculture: Reconnecting Farm, Food, and Community (Tufts University Press/University Press of New England, 2004)

13. James R. McConkey, English

The Telescope in the Parlor: Essays on Life and Literature (Paul Dry Books, 2004)

14. Hirokazu Miyazaki, Anthropology

The Method of Hope: Anthropology, Philosophy, and Fijian Knowledge (Stanford University Press, 2004)

15. Joyce Morgenroth, Theater, Film, and Dance

Speaking of Dance: Twelve Contemporary Choreographers on Their Craft (Routledge, 2004)

16. Muna B. Ndulo, Law, (with John Hatchard and Peter Slinn)

Comparative Constitutionalism and Good Governance in the Commonwealth: An Eastern and Southern Africa Perspective (Cambridge University Press, 2004)

17. Joel Porte, English

Consciousness and Culture: Emerson and Thoreau Reviewed (Yale University Press, 2004)

18. Nick Salvatore, Industrial and Labor Relations/American Studies

Singing in a Strange Land: C. L. Franklin, the Black Church, and the Transformation of America (Little, Brown, and Company, 2005)

19. Michael P. Steinberg, History

Listening to Reason: Culture, Subjectivity, and Nineteenth-Century Music (Princeton University Press, 2004)

20. Barry Strauss, History/Classics

The Battle of Salamis: The Naval Encounter that Saved Greece—and Western Civilization (Simon and Schuster, 2004)

21. Jae-Jung Suh, Peter J. Katzenstein, and Allen R. Carlson, Government

Rethinking Security in East Asia: Identity, Power, and Efficiency (Stanford University Press, 2004)

[› Top](#)

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[Design & Development](#) | *Last Updated:*



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ More Notables

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

Alyssa B. Apse, **Electrical and Computer Engineering**, and **D. Tyler McQuade**, **Chemistry and Chemical Biology**, were named two of the world's 100 Top Young Innovators in 2004 by *Technology Review*.

September 9, 2013
04:26:54 PM

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The Arecibo Observatory telescope, the largest and most sensitive single-dish radio telescope in the world got a new "eye on the sky," the **ALFA** (Arecibo L-Band Feed Array), which enables large-scale sky surveys with unprecedented sensitivity and data collection seven times faster than before.

The Cornell Center for Materials Research (CCMR), in cooperation with statewide regional technology development centers and funded by the New York State Office for Science, Technology, and Academic Research offered the first round of exploratory grants to help New York State companies, particularly small companies, find company-Cornell technology connections based on company needs and what Cornell has to offer.

The American Chemical Society paid tribute to Jack H. Freed, Chemistry and Chemical Biology, for his scientific accomplishments. An issue of the *Journal of Physical Chemistry B*, entitled the "Jack H. Freed Festschrift," was dedicated to him.

Cornell dedicated the G-Line, a division of CHESS (Cornell High Energy Synchrotron Source), which enables the design of new beam lines and the next generation of X-ray optics. It is the world's only such center on the central campus of a major research university.

The National Science Foundation awarded Cornell's Nanobiotechnology Center, the Sciencenter of Ithaca, and Painted Universe (a design and fabrication firm of Lansing, New York) \$1.8 million to design and build an exhibition that will explain nanoscale science to children. The "Too Small to See" exhibit will take children and adults on a journey through the world of nanodimensions.

Committing \$5 million over a period of five years,

Cornell joined a nationwide consortium—National LambdaRail (NRL)—that owns and operates a fiber-optic networking infrastructure for scientific computer communication. This provides the university's researchers with unprecedented high-speed connections and allows other upstate New York institutions to invest in and join the system.

The National Science Foundation awarded \$4.2 million over two years to the research consortium directed by Steven D. Tanksley, Plant Breeding and Genetics, for a project to sequence all 12 tomato chromosomes.

William P. Thurston, Mathematics, won the 2005 American Mathematical Society (AMS) book prize for *Three-Dimensional Geometry and Topology* (Princeton University Press), which describes Thurston's "geometrization program." The book is celebrated as a work that "has played such an important and dynamic role in modern mathematics."

An innovative PET "tracer" drug manufactured at Weill Cornell Medical College received U.S. Food and Drug Administration approval for use in diagnosing tumors, cardiovascular problems, and centers of epileptic activity in the brain using positron emission tomography (PET). The FDA's approval of fludeoxyglucose F18 injection is the second such approval in the country for this type of radiopharmaceutical application.

[› Top](#)

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[Design & Development](#) | Last Updated:



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Honors & Distinctions

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

📄 [Print This Page](#)

American Academy of Arts and Sciences

Leonard Gross, Mathematics

Wolf Foundation Prize

Steven D. Tanksley, Plant Breeding and Genetics

**National Institutes of Health Method to Extend
Research in Time (MERIT) Award**

Aaron J. Marcus, Medicine

**National Science Foundation Faculty Early Career
Development Program**

Alyssa B. Apsel, Electrical and Computer Engineering

Beckman Foundation Young Investigator Award

D. Tyler McQuade, Chemistry and Chemical Biology

**American Psychological Society, James McKeen Cattell
Award**

Stephen J. Ceci, Human Development

**Society for Human Resource Management, Michael R.
Losey Human Resource Research Award**

Lee D. Dyer, Industrial and Labor Relations

Fulbright Scholar Award

María Antonia Garcés, Romance Studies

Guggenheim Memorial Foundation Fellowship

Edwin A. Cowen, Civil and Environmental Engineering
Roger S. Gilbert, English
Douglas Mao, English

Sloan Foundation Research Fellowships

Fernando Escobedo, Chemical Engineering
Rasmus Nielsen, Biometrics

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[> Top](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Transferring Technology

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

[01. Tetragenetics, Inc., Brings IchVax Vaccine to Market](#)

In recent years, the laboratory of Theodore G. Clark, Microbiology and Immunology, began exploring biotechnological applications of *Tetrahymena thermophila* to over-express therapeutic proteins that are valuable for human and animal health.

[02. Health Sciences Group, Inc., Licenses Cornell's Apple Peel Powder](#)

Apple peels are a discarded waste product of processed apple products, typically dumped in landfills or reprocessed and sold as livestock feed or fertilizer.

[03. Transferring Technology, FY 2004](#)

Statistics

[> Top](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Cornell Research Funding

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

[01. Funding Cornell's Research, FY 2004](#)

[02. Expending Research Dollars, FY 2004](#)

[03. Ranking Cornell Nationally](#)

[04. Ranking Cornell in New York](#)

[> Top](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Centers & Colleges

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

[01. Crossing Disciplines](#)

Selected Research Centers at Cornell

[02. Cornell's Colleges & Divisions](#)

[> Top](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Credits

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

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RESEARCH AT CORNELL

ANNUAL REPORT FY 2004

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

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Duffield Hall, the remarkable new facility for advanced engineering technology, became fully functional in October. The Mars mission continued to produce important new results. The Cassini mission to Saturn returned spectacularly beautiful photographs and significant data about the satellites of Saturn. Cornell's research funding continued its steady growth, tracking the pattern of federal support for research. The vitality of our research enterprise is apparent.

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[> Top](#) / [> Read More](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

01. Rural Road



Josephine A. V. Allen and Eunice Rodriguez, Policy Analysis and Management, their research team of graduate and undergraduate students, and Jennifer Tiffany, director of Parent HIV Education Project, discovered an increase in knowledge and understanding of

AIDS/HIV/STDs and a reduction in AIDS-related worry among teenagers. However, they found mixed results in risk and protective behaviors. The researchers used a participatory action research (PAR) strategy to evaluate knowledge, communication, and prevention of HIV/STDs among adolescents ages 15 to 19 living in rural areas of upstate New York. The project, ROAD (Reach Out AIDS/HIV/STD Discussions), adapted and implemented respondent-driven sampling and participant-driven recruitment in order to obtain nonbiased samples of participants. The PAR strategy allowed the researchers to involve teenagers, parents, youth service providers, and community members in the research process, while contributing to learning and intergenerational communication.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

02. Drinking and Gender Harassment



Samuel Bacharach, Industrial and Labor Relations, led as director of the R. Brinkley Smithers Institute for Alcohol-Related Workplace Studies research that found a link between the drinking behavior of men in and around the workplace and gender harassment of female coworkers.

Gender harassment refers to a form of sexual harassment involving offensive or degrading remarks and actions usually directed at women by men. The researchers found that when alcohol consumption in and around the workplace increases, so does the risk of this type of harassment. This behavior creates a hostile workplace for women, and it is unlawful. The study has implications for sexual harassment prevention policies in the workplace, suggesting that a change in the perception of the acceptability of drinking during or around working hours may be effective at deterring harassment in work settings that are characterized by a strong drinking culture.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

03. Hear the Humming?



Andrew Bass

Andrew H. Bass, Neurobiology

and Behavior, led a team of researchers that discovered a relationship between increased levels of estrogen-like hormone and hearing sensitivity in female plainfin midshipmen fish. The researchers raised the level of the steroid

hormone in nonreproductive female fish, *Porichthys notatus*, temporarily altering their inner ear auditory mechanisms so they could hear the hum-like mating calls of the males and increase their reproductive capability. They found that the reproductive status of the females did not change (their eggs were still underdeveloped), but the researchers discovered instead a hormonal trigger for a complex auditory system. Steroid hormones seem to provide a key molecule that leads to fluctuations in the hearing sensitivity of females. The work has implications for researchers who study the human auditory system. The study suggests a function for the estrogen receptors in the human inner ear, and is relevant to women with Turner syndrome—a genetic abnormality resulting in the loss of estrogen production in the ovaries—who typically show an early onset of progressive high-frequency hearing loss.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

04. Converting Nitrogen into Ammonia



Paul Chirik

Paul Chirik, Chemistry and Chemical Biology, and his research team converted nitrogen into ammonia using a process that answers a basic chemical question—how to put an inert and unreactive nitrogen molecule into a useful form.

The researchers used a zirconium metal complex to add hydrogen atoms to the nitrogen molecule and convert it to ammonia without the high temperatures or high pressure that the current industrial process, the Haber-Bosch process, needs. Although the researchers do not expect their discovery to replace the Haber-Bosch process, it could be useful in making value-added nitrogen chemicals, such as hydrazines for rocket fuels or fine chemicals for drug synthesis or dyes. Nitrogen constitutes 78 percent of the Earth's atmosphere and is converted to ammonia-based fertilizer that sustains agriculture for about 40 percent of the world's population.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

05. Beyond Nano



Harold G. Craighead, Applied and Engineering Physics, and his research group, pushed the scale of their work beyond nano, picogram, and femtogram to attogram—the scale of viruses—using nanoelectromechanical systems (NEMS) devices. The researchers

used NEMS oscillating cantilevers to detect masses as small as six attograms by noting the change an added mass produces in the frequency vibration. The cantilevers, made from silicon and silicon nitrate are set into motion by an applied electric field or by hitting them with a laser. The frequency of vibration can be measured by shining a laser light on the device and observing changing reflection of light. The technology could be used to detect and identify microorganisms and biological molecules.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

06. Memory and Change



Timothy J. DeVoogd, Psychology/Neurobiology and Behavior, and his research group discovered—in a feeding study of black-capped chickadees (*Poecile atricapilla*)—the role that cannabinoids play in memory and the ability to handle change.

Cannabinoids are natural brain chemicals similar to *THC*, the active ingredient in marijuana. The researchers examined the function of a cannabinoid receptor called CB1-R in the bird's hippocampus, the same area of the human brain that stores memories. In this food-storage study, the researchers trained the birds to use certain food sites and then changed the sites. The researchers observed that memory in the cannabinoid-blocked birds improved, but they did not handle change well. Cannabinoid-signaling birds, however, had the flexibility to deal with the change. Since marijuana is known to impair the formation of new memories in humans, an anti-cannabinoid drug may improve the retention of a new memory, but the loss of the ability to change the memory may occur. This leads the researchers to believe that cannabinoid sensitivity in the brain provides a balance between accuracy and flexibility in memory.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

07. Jumping Species



Edward Dubovi

Edward J. Dubovi, Population Medicine and Diagnostic Sciences,

and research colleagues discovered an influenza virus that was transferred from horses to dogs. The outbreak of a severe respiratory illness among racing greyhounds in 2003–2004 in every state with

greyhound racetracks sent researchers on a search for the cause. Along with researchers at the University of Florida and the Centers for Disease Control (CDC), Dubovi's lab confirmed that an equine influenza virus, the H3 strain, had jumped species. This unexpected finding has important implications for zoonotic—interspecies transmission—diseases. The transmission may have always occurred but is only now identified because of the sensitivity of new testing methods. The discovery has alerted researchers of new opportunities to spot and avoid emerging disease outbreak.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
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- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

08. Class-Action Court



Theodore Eisenberg, Law, and New York University colleague Geoffrey P. Miller found that class-action court settlements are not escalating as commonly believed. For the past 10 years, the average price of settlements and the average attorney fees have been steady. The researchers analyzed data on state and federal class actions ranging from antitrust to consumer to securities law violations. The study also showed that the percentage of the recovery fee that attorneys receive decreases as the size of the recovery increases and that fees are usually higher in federal than in state court cases. The study is the first to provide empirical data on class-action settlements, and it highlights the need for better data about the U.S. legal system to help policymakers.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
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- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

09. The Shape of a Protein



Steven E. Ealick, Chemistry and Chemical Biology, and his graduate student Yan Zhang discovered the crystal structure of a protein, AIRs, which has a shape similar to other members of the riboside kinase family—proteins important in making DNA and RNA. This makes nine

members of the riboside kinase family believed to have evolved from a common protein ancestor, which Ealick's research group has deciphered. Knowing the genetic sequence of two proteins is not enough to discern whether the proteins, for example, have a similar function in an organism. It is therefore important to look at their structural features—to know what they look like—in order to decipher their evolution and function. The researchers' discovery is another step in determining what proteins look like. The group hopes to design a broad specificity riboside kinase as a laboratory tool for testing anticancer drugs and other pharmaceuticals. They also hope to decipher the structure of other riboside kinase family members.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

10. Corporate Finance



Yaniv Grinstein

Yaniv Grinstein, Johnson Graduate School of Management, and Ph.D. student Vidhi Chhaochharia disclosed findings that are helping regulators to assess both the desirability of corporate governance rules and the effect of the rules on shareholder wealth. The

researchers revealed investor reaction to the 2002 Sarbanes-Oxley legislation and exchange regulations governing financial disclosure and controls in publicly traded companies. Their paper, "Corporate Governance and Firm Value—the Impact of the 2002 Governance Rules," received the Best Paper in Corporate Finance Award from the Southwestern Finance Association (SFA). The SFA promotes finance research among academic scholars and practitioners and cosponsors the *Journal of Financial Research*.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

11. Taking Iron Supplements



Jere Haas, Nutritional Sciences, and doctoral student Thomas Brownlie found that among non-anemic women, iron supplements help only those with tissue-iron deficiencies. The study is the first to show differences between the physical abilities of non-anemic

women with low liver versus low tissue iron and to demonstrate that low iron without anemia does have functional consequences in humans. About 10 to 12 percent of U.S. women and 40 to 80 percent of women in developing countries are iron deficient but not anemic; most, however, are unaware of their condition. The researchers have shown in previous studies that even mild iron deficiency reduces endurance, the capacity for physical work, and exercise performance and that iron supplementation improves exercise training. This new study provides more evidence that mild to moderate iron depletion should be of greater concern.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

12. Stand at Your Computer



Alan Hedge

Alan Hedge, Design and Environmental Analysis, found in a study that four out of five workers prefer to stand at their computers for part of the day. Workstations in the study were equipped with electrically adjustable tables. People with the computer stations stood

about 20 percent of the day. They suffered from significantly less musculoskeletal upper-body discomfort and less afternoon discomfort and had significantly more productivity. Hedge conducted the study of 33 intensive computer users at a high-technology facility on the West Coast and an insurance company in the Midwest. An electrical height-adjustable work surface (EHAW) can be beneficial to people with back injuries or anyone who wishes to work in a variety of physical positions.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

13. Mysteries of Human Memory



Barbara Hempstead

Barbara Hempstead, Weill Cornell Medical College, Hematology/Oncology, and National Institutes of Health colleague Bai Lu identified the key events and proteins involved in long-term memory. Their findings provide insight into the biochemical basis of

memory and may help in the development of drugs to ameliorate memory disorders. The brain is filled with billions of neurons, each of which is connected to thousands of other neurons. The tiny gaps between neurons are synapses. Scientists believe that the brain “learns” by storing information in networks of neurons connected by efficient synapses, and it “remembers” by activating the proper networks. Forgetting information occurs when the synapses become less efficient so that the network holding the information disappears into the vastness of the networks in the brain. For more than a decade researchers have been studying synaptic efficacy and the role that certain proteins play, and working to identify the exact proteins and the interactions among them that allow a long-term memory to take hold. In Nobel Prize-winning work (2000) some of the crucial proteins in the process were identified. Hempstead’s and Lu’s research has shown that the local generation of a neurotrophin protein, brain-derived neurotrophic factor (BDNF), is the elusive key event that must occur to lock long-term memory in place.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

14. Hotels During Blackouts



Robert Kwortnik

Robert Kwortnik, Hotel

Administration, discovered that hotels are not prepared for a future blackout even though the massive Northeast power failure of August 2003 caused significant operating failures. Hotels suffered from failures such as loss of cooking ability and check-in and billing operations and failure of water supplies and backup power. Hotel managers and staff compensated with extraordinary personal service, such as escorting guests to their rooms by flashlight, providing cold food service or food ordered in, and carrying buckets of water to guest rooms. When surveyed, Kwortnik found that most hotels—from economy to luxury—had made no plans to prepare for future blackouts: they would depend on their staffs to accommodate guests. Although extended power outages due to weather and other factors are common, some believed the blackout to be a one-time occurrence. As a result of his study, Kwortnik highlighted a wide variety of actions hotel managers can take now to safeguard the service delivery system and better prepare for emergency events in the future. A Hyatt Hotel official hailed Kwortnik's report as one that should be required reading for hotel owners and managers.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

15. Selenium and Type 2 Diabetes



Xingen Lei, Animal Science, and his research colleagues discovered that an antioxidant enzyme containing selenium could promote type 2 diabetes. Selenium is a common dietary supplement taken to rid the body of free radicals, therefore helping to decrease the risks of cancer and heart disease. These benefits of selenium are related to its role in the production of glutathione peroxidase (GP), an antioxidant enzyme. The research of Lei's group suggests that the body needs some free radicals to regulate insulin sensitivity. The researchers found that mice with elevated levels of the antioxidant enzyme developed hyperglycemia, hyperinsulinemia, and more plasma leptin. They also became heavier and fatter than the control group of mice. These conditions are precursors to type 2 diabetes. Although selenium is known to detoxify the body, too much of it can be harmful. Type 2 diabetes is one of the fastest growing and most costly disorders worldwide.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

16. Photonic Chips



Michal Lipson

Michal Lipson, Electrical and Computer Engineering, provided a key component for future photonic chips, in which light replaces electrons. Lipson and members of the Cornell nanophotonics research group demonstrated a device on a silicon chip that permits one low-

powered beam of light to switch another on and off. Although the idea of silicon photonics has been around since the 1970s and previous devices on silicon have been developed, they were too large and required the beam of light that does the switching to be very high-powered. The researchers developed an all-optical switch on a silicon chip that confines the beam to be switched in a circular resonator, which reduces the space required and allows a very small change in refractive index to shift the material from transparent to opaque. Photonic circuits will be applied first in routing devices for fiber-optic communications.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

17. Tunable Nanotube Oscillator



Paul McEuen

Paul L. McEuen, Physics, and research colleagues created an electromechanical oscillator that could possibly weigh a single atom. This tiny device, made using a carbon nanotube, can be tuned across a wide range of radio frequencies. Previous experiments with nanoelectromechanical systems (NEMS) used vibrating silicon rods so small that they oscillate at radio frequencies. McEuen's research group replaced the silicon rods with a carbon nanotube to create an even smaller and more durable oscillator. Carbon nanotubes are cylinders of carbon atoms arranged in a hexagonal pattern similar to that of a buckyball. The Cornell device consists of a carbon nanotube that is one to four nanometers in diameter and about one-and-a-half micrometers long. In addition to use as a detector in a radio-frequency device, such as a cellular phone (which constantly changes operating frequency to avoid conflict with other phones), the device may be used in mass sensing and basic research.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

18. Debugging New Semiconductor Materials



David Muller

David A. Muller, Applied and Engineering Physics, and University of Tokyo research colleague Harold Hwang discovered that it is possible to precisely control the electronic properties of a complex material—which could be a replacement for silicon insulators—at

the nanoscale and without chemicals by creating empty spaces (or vacancies) that act as electron-donating dopants. The researchers found a way of seeing the vacancies inside complex oxides and controlling where the vacancies are. Missing atoms can change the properties of a material dramatically. Complex oxides easily lose a few oxygen atoms, making the material leaky and defective when exposed to electric fields. Manipulating at the single-atom scale the electronic properties of oxides for semiconductors will be important for debugging the new semiconductor materials and the first step in making devices from strontium titanate—a titanium-containing material that is the simplest of the complex oxides and the one that can be made in the largest quantities. The finding brings the replacement of silicon in transistors closer to becoming reality.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

19. Food—Insecurity or Security?



Christine Olson

Christine M. Olson, Nutritional Sciences, and research colleagues found in a study that poor rural families receiving food stamps from the U.S. Department of Agriculture may still suffer from food insecurity. When they controlled for income and financial resources, the number of

food and financial skills the mother used was one of the most significant factors in predicting whether a family was food insecure. This is the first study to show how important the food and financial skills and the health of the mother are in predicting when a family is food secure or not. The more skills the mother used, such as managing bills, making a budget, stretching foods, and preparing meals, the less likely she was to have a food-insecure household. Education in life skills such as those taught by Cornell Cooperative Extension and the Expanded Food and Nutrition Education Program are important ways to promote food security.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

20. Upstate New York Economy



Rolf J. Pendall, Matthew P. Drennan, and Susan M. Christopherson, City and Regional Planning, showed in a new study of upstate New York that the region still lags behind the national average in income and job growth. The average income increased about 2 percent

from 1980 to 2000, compared to 15 percent in the rest of the country. The researchers found that jobs are beginning to diversify, but manufacturing jobs need to be part of the diversification. The 206 active two- and four-year colleges and universities in upstate New York (more per capita than downstate or the nation) contribute, as a sector, by providing 3.7 percent of the jobs in the region, attracting students from downstate and out of state, training the region's workforce, and actively promoting economic development through relationships with industry in the area. Although upstate residents have more college education now than two decades ago, young educated working-age adults leave the region for better jobs. The researchers called for a state policy on economic growth, recommending such strategies as encouraging intermunicipal competition for businesses and taking advantage of educational institutions—Cornell and others—as centers of innovation.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:24 PM

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

21. Mystery of The Crane Dance



Nerissa Russell, Anthropology, and Cornell Lab of Ornithology research colleague Kevin McGown researched the question, why do people around the world dance like cranes? They studied evidence from an archaeological dig at a long-buried site of an Anatolian village and a

collection of modern bird bones in an Ithaca, New York, museum to help solve the mystery. Both cranes and human crane dancers are found worldwide, except in South America and Antarctica, and people today and thousands of years ago have observed bird dances. The researchers surmised that humans were so intrigued with cranes that in order to imitate the crane in dance, they laced the wings of cranes on their arms as part of their dance costumes. With the find of a crane wing stashed along with other items from animals, such as a cow's horns, in Catalhöyük (today's Turkey), the researchers believe an enduring mythic association with the animals in neolithic Anatolia existed. In pondering why people do crane dances, they made a list of human-crane similarities. The Cornell researchers received the Antiquity Essay Prize for the best scholarly article of the year for posing and attempting to answer the question.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

22. Secrets of Synaptic Activity



Timothy Ryan

Timothy A. Ryan, Weill Cornell Medical College Biochemistry/Biochemistry in Anesthesiology, discovered an important new step in the functioning of synapses, the gaps separating individual cells in the brain. Every human thought, action, and emotion

requires rapid, complex communication between millions of neurons in the brain. Packets of neurotransmitter chemicals called vesicles are carried from one brain cell to the next across the synapse. The vesicles bind with a cell's surface at the discharge point in a process called exocytosis. The empty vesicles need pick-up and refilling in a second process—endocytosis. Research in mice suggests a protein named synaptotagmin I has a dual function in synaptic activity. It has a key role in the drop-off of messenger neurotransmitter at the surface of brain cells and a role in picking up and recycling the emptied neurotransmitter packets of chemicals once the drop-off has taken place. Ryan's advance in understanding how neurons in the brain use chemicals to pass information across synapses is important to medical science because nearly all neurological diseases, addictions, and drugs aimed at the brain function rely on synaptic activity.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

23. Switching Brands



Judy A. Siguaw, Hotel

Administration, revealed in a study that guest satisfaction does not ensure repeat business or purchases for all consumers, even though marketers have long held that satisfied customers return. Siguaw and research staff found that brand

switching occurs among a hotel's most satisfied customers and that some of the least satisfied customers return even when dissatisfied. The researchers analyzed behavior among four guest segments—satisfied switchers, dissatisfied switchers, satisfied stayers, and dissatisfied stayers. Dissatisfied stayers were unwilling or unable to put forth the effort to identify and use alternative hotels. The study also found that business travelers were the least satisfied, least loyal, and least involved, and the most likely to be dissatisfied switchers. Satisfied switchers did not routinely select hotels where they had satisfactory experiences. Although hotel managers can use this new information to better define groups in which they want to invest, the study has implications beyond the hotel industry.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:27 PM

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

24. The Spirit of The Rovers



Steven W. Squyres, Astronomy, and his science team continued Mars exploration, long after the 90-sol life planned for the rovers (and they are still going after 427 martian days to date of active exploration). Squyres explained, "What sets this mission apart from almost every other

planetary mission that has ever flown is that every time a rover moves, you're some place new in an unexplored terrain, and you have to use that information to inform the decision process for the next sol." The goal of Squyres' team of researchers was to look for evidence of whether conditions were once right for life on Mars by seeking rocks that were formed in liquid water. The researchers would study the rocks to learn something about the environment and its suitability for life and to see if the minerals formed preserve ancient evidence of former life. Science magazine chose the discoveries of NASA's Mars Exploration Rover (MER) mission as Breakthrough of the Year in its December 17, 2004, edition. The discoveries culminated in evidence of the prolonged presence of potentially life-supporting, salty, acidic water on the Mars surface. The Cornell team of researchers consists of 28 people including James F. Bell, the lead scientist for the high-resolution, color, stereo-panoramic cameras that enabled the scientists to identify rocks and soil regions for suitable analysis. NASA has extended the mission up to 18 additional months, or however long the rovers last, through September 2006. The mission is managed by the Jet Propulsion Laboratory.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

25. Celebrating Friends



Steven Stucky

Steven E. Stucky, Music, composed *Second Concerto for Orchestra*, which was premiered in March 2004 by the Los Angeles Philharmonic, conducted by Esa-Pekka Salonen. Commissioned for the inaugural season of Walt Disney Concert Hall, the three-movement composition celebrates “friends”—paying homage to composers Ravel, Stravinsky, and Sibelius and saluting friends at the Los Angeles Philharmonic. The first movement, “Overture (with Friends),” carries the celebratory musical quotes; the second movement presents a theme and six variations providing six different characters of music; and the finale contains solos and “combos,” which are brought together by an *allegro energico* beat. The piece has won the 2005 Pulitzer Prize for Music.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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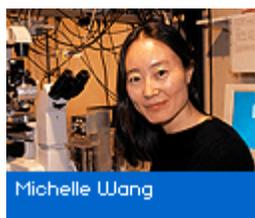
A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

26. DNA Unzipped



Michelle Wang

Michelle D. Wang, Physics, and research colleague Steven J. Koch discovered a technique for pulling apart, or unzipping, two strands of DNA and loosening restriction enzymes and other proteins in the process. The technique—called unzipping force analysis of protein association, or UFAPA—could be used for restriction mapping, the first critical step in genomic sequencing, as well as for actual sequencing where the sequence of DNA is determined with a large number of restriction enzymes. The technique enables scientists to determine more about the roles of DNA-binding proteins. For drug development, the process could be automated, and pharmaceutical companies could use it to screen collections of small molecules for affinity to DNA. A Cornell patent is under review for the technique.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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[Design & Development](#) | *Last Updated:*

September 9, 2013
04:27:30 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

27. Falling Paper, Falling Leaves



Z. Jane Wang

Z. Jane Wang, Theoretical and Applied Mechanics, and Ph.D

student Umberto Pesavento solved the long-intriguing mystery of the rise and glide of falling paper and of other thin, flat things such as autumn leaves on a windless day.

Using advanced computer technology, the researchers showed why the falling trajectory of thin flat things—and the behavior of airflow and other forces—is not predicted by the classical aerodynamic theory. They explained that flat paper rises on its own as it falls, which would not happen if the force due to air were similar to that on an airfoil. The force, instead, depends on the coupling between the rotating and translational motions of the object. The researchers also showed that the falling-paper effect is almost twice as effective for slowing an object's descent, compared to the straight down parachute effect. The falling-paper effect is beneficial to trees and other plants that need to disperse seeds some distance from the point of origin. Plants with flattened seedpods also exploit this effect.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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[Design & Development](#) | Last Updated:

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04:27:32 PM

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C: [Credits](#)



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

28. Seeing Millisecond Nerve Impulses



Watt W. Webb, Applied and Engineering Physics, and graduate student Daniel A. Dombek made high-resolution images of millisecond nerve impulses in healthy and diseased brains. The first demonstration of the new optical recording technique was in neurons

of the sea slug, *Aplysia*. The researchers combined the bright laser light of multiphoton microscopy (invented by Webb and Winfried Denk) with specially developed dyes and a phenomenon called second-harmonic generation (SHG) to produce the high-resolution, three-dimensional pictures of tissue with minimal damage to living cells. The technique of imaging millisecond-by-millisecond signaling through nerve cells may eventually be used in brain tissue of higher animals and could help decipher the wiring of the brain and possibly explain consequences of degenerative brain diseases such as Alzheimer's.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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[Design & Development](#) | Last Updated:

September 9, 2013
04:27:33 PM

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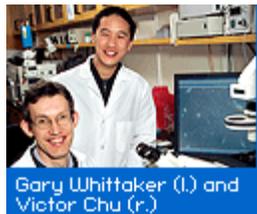
A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

29. On The Trail of Influenza



Gary Whittaker (l.) and Victor Chu (r.)

Gary R. Whittaker, Virology, and graduate student Victor C. Chu discovered a critical step in flu virus infection. The flu virus uses the newly discovered pathway to enter and infect a cell. After the virus attaches to a cell, there is a second step in which an unknown co-receptor allows the virus to enter a cell. Scientists have known for 50 years how the influenza virus attaches to cells before it infects them. The Cornell researchers showed that the influenza virus requires a protein to enter cells. With the discovery of this second stage in influenza infection, the researchers can now trace the receptor. Once identified, new antiviral medications and vaccines could be developed to target all influenza viruses, not just individual strains. New strains of flu continue to emerge for which there is no vaccine. Influenza kills about 20,000 people every year in the United States and about a half million people worldwide.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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September 9, 2013
04:27:34 PM

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C: [Credits](#)



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

30. Imitating Nature



Ulrich B. Wiesner, Materials Science and Engineering, and his research team designed self-assembling molecules that imitate nature's system of organizing living tissue. Just as our bodies consist of functional assemblies of molecules, such as cell walls that form

spontaneously, so are these new macromolecules designed to self-assemble. The researchers encode information about self-assembly behavior into the structure of the macromolecules. These new macromolecules change their structure several times as the temperature rises (called a rich-phase behavior), and each stable phase produces a different behavior. Some of the molecules are cylindrical, some look like a double sandwich, and some are continuous three-dimensional cubic structures. By mimicking nature, it is possible to design nanoscale structures that otherwise would be impossible to manufacture. The technique could lead to the creation of devices with dimensions smaller than those possible with lithography—a development that the microelectronics industry has been seeking. These new macromolecules could also lead to improvements in solar-cell and fuel-cell technology.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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September 9, 2013
04:27:35 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Faculty Research

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

31. Rings and Moons



Joseph A. Burns

Joseph A. Burns, Theoretical and Applied Mechanics/Astronomy; Joseph Veverka, Steven W. Squyres, Peter Gierasch, Philip Nicholson, and Senior Researcher Peter Thomas, Astronomy, form the Cornell team for the Cassini-Huygens space mission to Saturn—

the planet with rings and 31 known moons. When the spacecraft went into orbit as a satellite of Saturn in June 2004, the scientific instruments of the Cornell team were on board to analyze Saturn's largest moon, Titan, for the four years of the primary mission. Hours after the Cassini-Huygens spacecraft went into orbit around Saturn, it sent back 61 images of the planet's rings described as astonishing, mind-boggling, and with much beauty and clarity. Researchers were looking at structures never before seen.

The Cornell instruments include two main cameras for taking wide and narrow angles of Saturn and its rings and moons and the composite infrared spectrometer (CIRS), which measures the thermal radiation of the region under study. The cameras use charge couple devices (CCDs)—silicon chips that change photons of light into electronic signals used to make images of astronomical objects or analyze how much light is being received from such objects. The cameras have many filters that operate between ultraviolet and near-infrared wavelengths, ideal for examining the atmosphere of Titan and showing close-up details of the moon's surface.

The 700-pound Huygens probe landed on Titan in January 2005. The probe is the first spacecraft to make direct contact with the surface of a moon of another planet. The Cassini mission is a cooperative project of NASA, the European Space Agency, and the Italian Space Agency. The Jet Propulsion Laboratory (JPL) manages the mission for NASA.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

01. N'Dri T. Assié-Lumumba, ed., *Africana Studies and Research Center*

September 9, 2013
04:27:37 PM

Cyberspace, Distance Learning, and Higher Education in Developing Countries: Old and Emergent Issues of Access, Pedagogy, and Knowledge Production (Brill, 2004). The new

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information and communication technologies (ICTs) offer educational possibilities for developing countries. However, ICTs are often perceived as a panacea, particularly for the expansion of higher education. Assié-Lumumba argues that there is a need to analyze persistent and new grounds of unequal opportunity for access, learning, and the production of knowledge. The book addresses fundamental questions about the educational process, including the use of technology in higher education as a holistic educational system for social development. The essays on developing countries, with a focus on Asia and Africa, include case studies and deal with vital issues in education.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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[Design & Development](#) | *Last Updated:*



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

02. Lourdes Benería, City and Regional Planning/Women Studies



organizations for several decades. There is an underside—and a human side—to development, and feminism has made inroads into the technical and policy debates by examining what the past and even the future holds for the people who live it. Benería highlights the ways in which feminist analysis has contributed to a richer understanding of international development and globalization. Combining theoretical, empirical, and political perspectives, the book discusses cutting-edge debates on development, globalization, economic restructuring, and feminist economics. Hailed as a “wonderfully interesting book ... that enlightens both the fields as well as the challenges of globalization in the contemporary world” (Amartya Sen), Benería presents the definitive primer on global feminist economics.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:39 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

03. Richard F. Bensel, Government



Richard Bensel



The American Ballot Box in the Mid-Nineteenth Century (Cambridge University Press, 2004). Bensel describes what it was like for Americans to vote in the middle of

the nineteenth century. When men approached the polling place, they were met by agents of the major political parties who treated them to whisky, gave them petty bribes, and urged them to be loyal to their ethnic and religious communities. As reported in the eyewitness accounts of ordinary voters, the polls were almost always crowded and noisy—and often violent. Unlike modern elections, however, the polling place was also thoroughly endowed with symbolic meaning for individuals who otherwise would not have had the least interest in politics or who knew very little about national or local political affairs and what an election meant. This made the polls exciting and encouraged men to vote at far higher rates than they do today. The study provides a unique window into how American democratic culture has changed since the nineteenth century.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:40 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

04. Mabel M. Berezin, ed., *Sociology*, (with Martin Schain)



Mabel Berezin

Europe without Borders: Remapping Territory, Citizenship, and Identity in a Transnational Age (Johns Hopkins University Press, 2004). The creation of the European Union in 1992

reflected new economic, political, and cultural realities on the continent. The dissolution of national borders and the easing of transit restrictions on people and goods within Europe have contributed to a radical rethinking of such basic concepts as national sovereignty and citizenship. Berezin and Schain bring together leading experts from the fields of sociology, political science, geography, psychology, and anthropology to examine the intersection of identity and territory in the new Europe. This boldly interdisciplinary effort—with topics such as how Europeans now see themselves in relation to national identity—explores an emerging global phenomenon that will have profound political, social, and economic consequences in both Europe and around the world. J. P. Morgan Investment Bankers chose the book as one of the 10 books that their clients should read over the summer.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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September 9, 2013
04:27:41 PM

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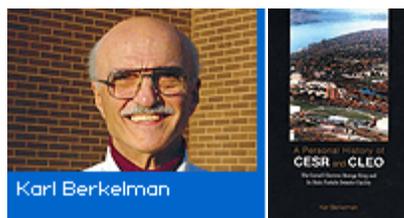
A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

05. Karl Berkelman, Physics



account of the Cornell Electron Storage Ring (CESR) and its main detector facility, CLEO, is based on Berkelman's recollections as a participant. The book covers the beginning of CESR and CLEO in the late 1970s until the end of data collection at particle energies above the threshold for B meson production in June 2001. The CESR electron-positron collider was the culmination of a series of electron accelerators constructed at the Cornell Laboratory of Nuclear Studies starting in 1945. Measurement of the products of the $e+e-$ collisions was performed with the multipurpose CLEO apparatus, built and operated by the CLEO collaboration, which consisted of about 200 faculty, staff, and graduate students from more than 20 universities.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

06. Urie Bronfenbrenner, ed., *Human Development*



Making Human Beings Human: Bioecological Perspectives on Human Development (Sage Publications, 2005). This collection of 23 articles traces the historical development of

Bronfenbrenner's groundbreaking bioecological model of human development, detailing how it can be applied via programs and policies. The articles, written mostly by Bronfenbrenner over the course of six decades, is a culminating work and statement that he hopes will shape the future of his field. Bronfenbrenner, the cofounder of the federal Head Start program, is widely regarded as one of the world's leading scholars in developmental psychology, childrearing, and human ecology—the discipline he created. His model of the ecology of human development acknowledges that humans do not develop in isolation, but in relation to their family and home, school, community, and society. The book is hailed as a “marvelous book to read and cherish from one of our giants in the field of human development.”

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

07. Calum M. Carmichael, Comparative Literature/Law



Calum Carmichael

Ideas and the Man: Remembering David Daube (Vittorio Klostermann, 2004). One of the twentieth century's foremost legal scholars, David Daube used his knowledge of

law to bridge the gap between humanism and religion and showed that the study of ancient law is uncannily relevant to how we function today. Daube's career spanned the entire twentieth century, with equal periods of his life spent first in Germany, then in Great Britain, and finally in the United States. Crossing traditional disciplinary lines, he communicated in an urbane, lively manner with profound and often unexpected insights into the ancient world and into human conduct at all times and places. A major contribution was to revolutionize prevailing perceptions about the New Testament with his sophisticated understanding of how Talmudic law and literature illuminate that text. Carmichael, Daube's former Oxford pupil and lifelong colleague, has created a memoir that captures the mischievous wit and spirit of enlightenment that Daube exuded in person and in his scholarship.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

08. Raymond B. Craib, History



Raymond Craib

Cartographic Mexico: A History of State Fixations and Fugitive Landscapes (Duke University Press, 2004). Cartographic routines such as exploration, surveying, and mapmaking played a powerful role in the creation of the modern Mexican state. Such routines were part of a federal obsession—or “state fixation”—with determining and fixing geographic points, lines, and names in order to facilitate economic development and political administration. In addition to analyzing the maps that resulted from such routines, Craib examines in close detail the processes out of which they were created. Taking central Veracruz as a case study and drawing upon an array of sources—maps, peasants’ letters, official reports, and surveyors’ journals and correspondence—Craib shows how in the field, agrarian officials, military surveyors, and metropolitan geographers traversed a “fugitive landscape” of overlapping jurisdictions and use rights, ambiguous borders, and shifting place names, while encountering villagers with their own conceptions of history and territory. The book reveals that surveying and mapmaking were never mere technical procedures, but were—and remain—profoundly social and political practices.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

09. Ronald G. Ehrenberg, ed., Labor and Industrial Relations/Economics

September 9, 2013
04:27:47 PM

Ronald Ehrenberg

Governing Academia: Who Is in Charge at the Modern University? (Cornell University Press, 2004). Public concern over sharp increases in undergraduate tuition

has led many to question why colleges and universities cannot behave more like businesses and cut their costs to hold tuition down. Ehrenberg and his coauthors, all leading academic administrators and scholars, assert that understanding how academic institutions are governed provides part of the answer. Among the topics discussed in the book are how states regulate institutions of higher education and govern their public institutions; the nature of boards of trustees; the roles of trustees, administrators, and faculty in shared governance on campuses; how universities are organized for fiscal and academic purposes; collective bargaining; pressures from regulators, donors, insurance carriers, athletic conferences, and accreditation agencies; and competition from for-profit providers.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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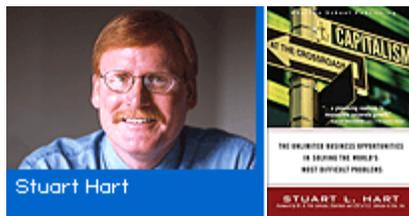
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RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

10. Stuart L. Hart, Johnson Graduate School of Management



Stuart Hart

Capitalism at the Crossroads: The Unlimited Business Opportunities in Solving the World's Most Difficult Problems (Wharton School Publishing, 2005). This

work introduces a plan for corporations to grow and thrive while reducing world poverty, reversing environmental degradation, and counteracting terrorism. In Hart's brand of inclusive capitalism, corporate strategy involves making sustainable products designed to be drivers of economic growth that are salable to an expanding market for such products—the world's 4 billion poorest people. Hart's book takes the contrarian's view that business, more than government or civil society, is uniquely equipped to lead us toward a sustainable world. The book is praised as a "pioneering roadmap to responsible macroeconomics and corporate growth," as well as a "must-read for every CEO—and every MBA."

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:48 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

11. Dominick C. LaCapra, History/Comparative Literature



History in Transit: Experience, Identity, Critical Theory (Cornell University Press, 2004). LaCapra explores the relation of historiography (or historical writing) and critical theory that tests the assumptions and implications of the way one approaches the past. He offers a revised understanding of psychoanalysis in order to render more self-aware the relation between the historian and his or her material. He also investigates critically the recent turn in history to the problem of experience, including memory and identity, by discussing the relation between extreme—typically violent—events in history, epitomized by the Holocaust, and the role of trauma and its aftermath. More generally, the book explores relationships that have been insufficiently theorized: between experience and identity, between history and various theories of subjectivity, between extreme events and their representation, between institutional structures and the kinds of knowledge produced within them. Taken together, these discussions form a dialogical encounter, positing the links among epistemological questions, historicist ones, and issues pertaining to disciplinary and institutional politics. Experience emerges as a category both theoretically determined and anchored in the facticity of the everyday.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

12. Thomas A. Lyson, *Development Sociology*



Thomas Lyson

Civic Agriculture: Reconnecting Farm, Food, and Community (Tufts University Press/University Press of New England, 2004). This analysis of food production in the United

States describes the rebirth of locally based agricultural production and marketing systems, showing how this renaissance is closely tied to a local community's social, cultural, and economic fabric. Lyson not only introduces the concept and underpinnings of modern-day "civic agriculture"—a term coined by Lyson and now commonly used to denote contemporary community-based food production and distribution—but also offers a critical perspective on today's highly globalized and industrialized food production and marketing systems. Civic agriculture embraces innovative ways to produce, process, and distribute food, and it represents a sustainable alternative to the socially, economically, and environmentally destructive practices associated with conventional large-scale agriculture. Examples of civic agriculture include farmers' markets, community gardens, and community-supported agriculture.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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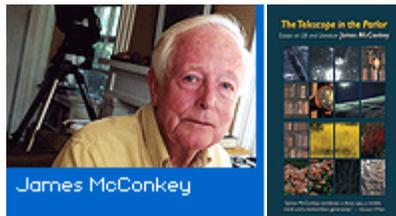
A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

13. James R. McConkey, English



the authors and experiences that have meant the most to him. In “Three Autobiographical Essays” and “A Story for a Child,” McConkey poignantly recalls events of courting and family life that remain as clear to his inner vision as the day they took place. In “Eight Essays about Literature,” he explains why he loves the books he loves and why he responds to the work of A.R. Ammons, Anton Chekhov, and E.M. Forster, among others. *Publishers Weekly* acclaimed the book to be “elegant and deeply personal, ... revealing a seasoned mind and a soulful spirit.”

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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September 9, 2013
04:27:52 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

14. Hirokazu Miyazaki, Anthropology



investigating how hope is produced in various forms of knowledge—Fijian, philosophical, anthropological. Miyazaki describes the book as “an ethnographic demonstration of a very simple argument: hope is a method of knowledge for apprehending a present moment of knowing.” The book discusses the hope entailed in a wide range of Fijian knowledge practices such as archival research, gift giving, Christian church rituals, and business practices, and compares it with the concept of hope in the work of philosophers such as Immanuel Kant, Ernst Bloch, Walter Benjamin, and Richard Rorty. The book aims to carve out a space for a new kind of relationship between anthropology and philosophy.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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September 9, 2013
04:27:53 PM

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C: [Credits](#)



ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

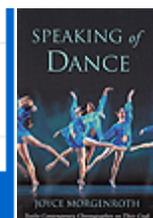
- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

15. Joyce Morgenroth, Theater, Film, and Dance



Joyce Morgenroth



Speaking of Dance: Twelve Contemporary Choreographers on Their Craft (Routledge, 2004). Morgenroth juxtaposes the choreographic processes of some of America's

most engaging and revolutionary choreographers. Based on personal interviews, the book's narratives reveal, among other things, Merce Cunningham's unquenchable fascination with movement, Meredith Monk's spiritual quest, Bill T. Jones's desire to change the world, Trisha Brown's engagement with structure, and Mark Morris's profound musicality. Morgenroth shows how the ideas, craft, and passion that go into their work have led these choreographers to disrupt set forms and expectations: dancing on the sides of buildings, in city streets, in rivers and lakes; moving to music, sounds, speech, and silence; costumed in ordinary clothes, shredded leotards, or nothing at all. The history of dance in the making is revealed through the stories of these intelligent, articulate, and witty dancemakers.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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September 9, 2013
04:27:54 PM

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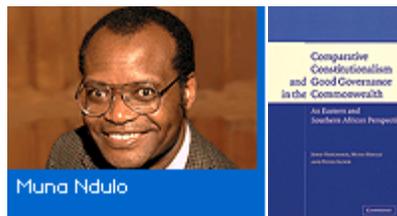
A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

16. Muna B. Ndulo, Law, (with John Hatchard and Peter Slinn)



Muna Ndulo

Comparative Constitutionalism and Good Governance in the Commonwealth: An Eastern and Southern Africa Perspective (Cambridge University Press, 2004). The central

role that good, effective, and capable governance plays in the economic and social development of a country is now widely recognized. Using the Commonwealth countries of eastern and southern Africa, this book analyzes some of the key constitutional issues in the process of developing, strengthening, and consolidating the capacity of states to ensure the good governance of their peoples. Utilizing comparative material, the book seeks to draw lessons, both positive and negative, about the problems of constitutionalism in the region and, in doing so, critically addresses the legal issues involved in seeking to make constitutions work in practice.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:56 PM

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ANNUAL REPORT FY 2004

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→ Selected Books by Faculty

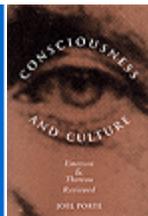
- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

17. Joel Porte, English



Joel Porte



Consciousness and Culture: Emerson and Thoreau Reviewed (Yale University Press, 2004). Porte offers a reevaluation of the work and careers of two commanding

nineteenth-century figures—Emerson and Thoreau—as well as an assessment of their role as purveyors of culture to a provincial America. Praised as a fine, learned, and spirited book by the recognized authority on his subject, this collection of essays will appeal to all readers interested in the writings of Thoreau and Emerson.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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04:27:57 PM

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

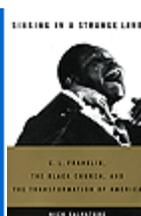
- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

18. Nick Salvatore, Industrial and Labor Relations/American Studies

September 9, 2013
04:27:58 PM

Nick Salvatore



Singing in a Strange Land: C. L. Franklin, the Black Church, and the Transformation of America (Little, Brown, and Company, 2005). Many Americans today vaguely remember

Reverend C. L. Franklin (1915–1984) as the father of Aretha Franklin, the “Queen of Soul.” Yet to meet Franklin through this biography reveals not merely a fascinating person whose career illuminates so many aspects of the black American experience: to know Franklin is to grasp more fully central issues in modern American life. Salvatore studied more than 70 sermons given by Franklin, the pastor of Detroit’s New Bethel Baptist Church, 1946–1979, and a leading proponent of the civil rights movement. One of Franklin’s most popular sermons—“Without a Song,” based on Psalm 137—inspired the book’s title. Franklin challenged the scripture in which the Israelites in Babylonian captivity are asked to sing for their captors, to which the Israelites respond, “How shall we sing the Lord’s song in a strange land?” Franklin countered with the message: the Israelites should have sung; some things you can’t say, but you can sing. Salvatore considered this the key to much of Franklin’s life and its legacy. In general, Franklin’s sermons provided “social and political analyses that consciously urged others to discover their voices and to engage in the world about them,” says Salvatore.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

19. Michael P. Steinberg, History



Listening to Reason: Culture, Subjectivity, and Nineteenth-Century Music (Princeton University Press, 2004). This pathbreaking work reveals the pivotal role of music—musical works and musical culture—in debates about society, self, and culture that forged European modernity through the “long nineteenth century.” Ranging from Mozart to Mahler, from sacred to secular—including opera and symphonic and solo instrumental music—Steinberg argues that from the late 1700s to the early 1900s music reflected and embodied modern subjectivity as it increasingly engaged and criticized old regimes of power, belief, and representation. The book could become the “next big statement on nineteenth-century music as a cultural phenomenon.”

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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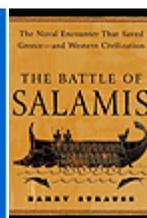
- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

20. Barry Strauss, History/Classics



Barry Strauss



The Battle of Salamis: The Naval Encounter That Saved Greece—and Western Civilization (Simon and Schuster, 2004). For six months in 480 B.C., the course of Western history hung in

the balance as Xerxes, leader of the Persian Empire, began to move troops across the Hellespont, eventually taking the Athenian Acropolis. Themistocles, leader of Athens and admiral of its fleet of triremes, devised an ingenious strategy that nevertheless deceived, defeated, and destroyed the Persians, all in one day. This book illustrates how Themistocles planned and set the trap for the Persian ships in the narrow Salamis Strait, and it recounts the astonishing and dramatic battle, which made Athens the dominant power in Greece, thereby setting the stage for the Golden Age of Pericles. Drawing on recent work in archaeology, meteorology, and forensic science, as well as on his own experience as a rower (both navies were oar-powered), Strauss revises our understanding of this singular battle, which is still studied for its tactical genius. The book was named by the *Washington Post* as one of the best books of the year 2004. It is being translated into five languages.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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RESEARCH AT CORNELL

→ Selected Books by Faculty

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

21. Jae-Jung Suh, Peter J. Katzenstein, and Allen R. Carlson, *Government*



Rethinking Security in East Asia: Identity, Power, and Efficiency (Stanford University Press, 2004). These scholars put their complementary wisdom and expertise in Korean, Japanese, and Chinese security affairs together to make a case for a new theoretical approach to the study of Asian security. They call it "analytical eclecticism." Throughout the 1990s, conventional wisdom among U.S. scholars of international relations held that institutionalized cooperation in Europe fosters peace, while its absence from East Asia portends conflict. Developments in Europe and Asia in the 1990s contradict the conventional wisdom without discrediting it. Explanations that derive from only one paradigm or research program have shortcomings beyond their inability to recognize important empirical anomalies. International relations research is better served by combining explanatory approaches from different research traditions. Within this framework, the authors explore the prospects for peace in East Asia and the potentially destabilizing political developments.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Transferring Technology

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

01. Tetragenetics, Inc., Brings IchVax Vaccine to Market



Theodore Clark

In recent years, the laboratory of Theodore G. Clark, Microbiology and Immunology, began exploring biotechnological applications of *Tetrahymena thermophila* to over-express therapeutic proteins that are valuable for human and animal health. *Tetrahymena* is a single-celled organism, and it is the first animal-like cell to be grown in pure culture. It has long been a model for studies in molecular biology. Clark's idea for the "TetraExpress" system won recognition as a finalist in the Business Idea Competition. With the help of a team of colleagues at University of Georgia and University of Rochester and entrepreneurs including alumnus R. Douglas Kahn, Clark founded Tetragenetics, Inc. The company's first product, IchVax, is a vaccine to treat a well-known disease in fish. Efforts in strategic partnering are under way to develop a wider range of products that will include monoclonal antibodies, industrial enzymes, and reagent kits for the life science research market.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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RESEARCH AT CORNELL

→ Transferring Technology

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

02. Health Sciences Group, Inc., Licenses Cornell's Apple Peel Powder



Rui Hai Liu

Apple peels are a discarded waste product of processed apple products, typically dumped in landfills or reprocessed and sold as livestock feed or fertilizer. It is estimated that over 20 million pounds of waste peels are generated each year by New York's applesauce, juice, and canned fruit processors. The laboratory of Rui Hai Liu, Food Science, developed a technology for producing apple peel powder, a process that preserves the naturally high level of antioxidant activity found in peels. The technology was licensed to Health Sciences Group, Inc. (HESG), an integrated provider of science-based products and ingredients to the nutrition, skin care, and food and beverage industries. HESG plans to commercialize the technology as a proprietary nutraceutical ingredient that can be added to a variety of foods and beverages to enhance the nutritional content.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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RESEARCH AT CORNELL

→ Transferring Technology

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

03. Transferring Technology, Statistics FY 2004

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Invention Disclosures

Disclosures Received 225

U.S. Patents

First-Time Applications Filed 88

Applications Pending 512

Patents Issued 52

Patents in Force 594

Foreign Patents

Applications Filed 40

Applications Pending 746

Patents Issued 30

Patents in Force 238

Licenses

Licenses and Options 87

Total Equity Deals with Startups 37

Active Licenses 497

Number of Companies Started 9

License Revenue

Sources

License Fees \$3,420,800

Patent Reimbursements \$1,723,700

Royalties \$2,265,900

Total License Revenue \$7,410,400

Source: Cornell Center for Technology, Enterprise, and Communications (CCTEC)

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)
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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Cornell Research Funding

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

01. Funding Cornell's Research, FY 2004

By Dollars Expended

Dollars in Thousands

Sources

Total Federal Sources

Sponsored	\$361,004
Budgeted	356,059
	4,945

Total Non-Federal Sources

Sponsored Total

State & Local Governments	176,720
Corporations & Trade Associations	84,926
Foundations	14,719
Non-Profit Organizations	23,045
All Others	15,928
	27,183
	4,051

Budgeted Total

Cornell	91,793
New York State	59,665
	32,128

Federal Agencies

DHHS Department of Health & Human Services	180,288
NSF National Science Foundation	102,177
DOD Department of Defense	20,298
NASA * National Aeronautics Space Administration	18,513
USDA Department of Agriculture	16,602
DOE Department of Energy	6,922
AID Agency for International Development	4,163
All Others	7,098

Source: Cornell University, Office of Sponsored Programs
Discrepancies may occur due to rounding.

* NASA includes JPL funds under subcontract.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Cornell Research Funding

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

[Print This Page](#)

02. Expending Research Dollars, FY 2004

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Total Research Expenditures, FY 2004

Dollars in Thousands

\$537,725

By Cornell Divisions



Dollars in Thousands

By Disciplines

Medical Sciences	\$164,900
Physical Sciences	90,409
Biological/Life Sciences	69,734
Engineering	63,155
Agriculture	59,727
Computer & Information Sciences	24,653
Veterinary Medicine	22,279
Social Sciences	21,219
Environmental Sciences	4,561
Psychology	3,499
Mathematical Sciences	3,320
Arts, Humanities, & Cultural Studies	814
<i>Nondisciplinary Research Expenditures</i>	
Graduate Student Tuition Support	8,487
Research Administration & Support	970

Source: Cornell University, Office of Sponsored Programs
Discrepancies may occur due to rounding.
Disciplines are defined by the National Science Foundation.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ [Cornell Research Funding](#)

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

03. Ranking Cornell Nationally

Dollars in Thousands

By Research Expenditures, NSF FY 2003

John Hopkins University *	\$1,244,132
University of California, Los Angeles	849,357
University of Michigan	780,054
University of Wisconsin, Madison	721,248
University of Washington	684,814
University of California, San Francisco	671,443
University of California, San Diego	646,508
Stanford University	603,227
University of Pennsylvania	564,716
Cornell University	554,760

Source: National Science Foundation

* The John Hopkins University includes the Applied Physics Laboratory, with \$607 million in total R&D expenditures.

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ [Cornell Research Funding](#)

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

04. Ranking Cornell in New York

September 9, 2013
04:28:10 PM

Dollars in Thousands

By Research Expenditures, NSF FY 2003

Cornell University	\$554,760
Columbia University	437,669
University of Rochester	285,768
New York University	241,593
SUNY Buffalo	240,180
Mount Sinai School of Medicine	214,514
SUNY Stony Brook	200,330
Rockefeller University	192,143
Yeshiva University	177,236
SUNY Albany	120,655

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Source: National Science Foundation

[> Top](#) / [> Next Article](#) / [> Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Centers & Colleges

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

01. Crossing Disciplines

Selected Research Centers at Cornell

Nanoscale Science and Technology

Alliance for Nanomedical Technologies
Center for Biochemical Optoelectronic Microsystems
Center for Nanoscale Systems
Cornell Center for Materials Research
Cornell NanoScale Science and Technology Facility *
Nanobiotechnology Center

Medical Research

Ansary Center for Stem Cell Therapeutics
Center for Aging Research and Clinical Care
Center for Complementary and Integrative Medicine
Center for the Study of Hepatitis C
Center for Vascular Biology
Cornell HIV Clinical Trials Unit
Dyson Vision Research Institute
Hamad bin Khalifa Institute of Genetic Medicine
Howard Gilman Institute for Valvular Heart Diseases
Institute for Computational Biomedicine
Institute for Reproductive Medicine
Sackler Institute for Developmental Psychobiology

Life Sciences

Agricultural Experiment Stations (Geneva; Ithaca)
Baker Institute for Animal Health
Cancer Protein Expression Laboratory
Center for the Environment
Cornell International Institute for Food, Agriculture, and Development
Institute for Genomic Diversity
Institute for Biotechnology and Life Science Technologies
Institute of Food Science
National Biomedical Center for Advanced ESR Technology
New York State Center for Life Science Enterprise
Sprecher Institute for Comparative Cancer Research

Physical Sciences and Engineering

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04:28:11 PM

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Center for Applied Mathematics
Center for Radiophysics and Space Research
Cornell High Energy Synchrotron Source *
Cornell Theory Center
Laboratory of Atomic and Solid State Physics
Laboratory for Elementary-Particle Physics *
Multidisciplinary Center for Earthquake Engineering Research
National Astronomy and Ionosphere Center *

Social Sciences and Humanities

Africana Studies and Research Center
Bronfenbrenner Life Course Center
Center for Analytic Economics
Center for the Study of Economy and Society
Center for the Study of Inequality
Cornell Institute for Research on Children
Cornell Institute for Social and Economic Research
Cornell Language Acquisition Lab
Employment and Disability Institute
Institute for the Social Sciences
Institute for Women and Work
Mario Einaudi Center for International Studies
Program on Ethics and Public Life
Society for the Humanities

Business/Management

Center for Advanced Human Resource Studies
Center for Hospitality Research
Center for Manufacturing Enterprise
Parker Center for Investment Research
Smithers Institute for Alcohol-Related Workplace Studies

* National Center

[› Top](#) / [› Next Article](#) / [› Back to Listing](#)

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ANNUAL REPORT FY 2004

A DISTINCTIVE EDGE
RESEARCH AT CORNELL

→ Centers & Colleges

- ⌘ [Home Page](#)
- ⌘ [Reviewing the Year](#)
- ⌘ [Selected Faculty Research](#)
- ⌘ [Selected Books by Faculty](#)
- ⌘ [More Notables](#)
- ⌘ [Honors & Distinctions](#)
- ⌘ [Transferring Technology](#)
- ⌘ [Cornell Research Funding](#)
- ⌘ [Centers & Colleges](#)

 [Print This Page](#)

02. Cornell's Colleges and Divisions

College of Agriculture and Life Sciences †
College of Architecture, Art, and Planning
College of Arts and Sciences
College of Engineering
College of Human Ecology †
College of Veterinary Medicine †
Division of Nutritional Sciences
Faculty of Computing and Information Science
Graduate School
Johnson Graduate School of Management
Law School
School of Continuing Education and Summer Sessions
School of Hotel Administration
School of Industrial and Labor Relations †
Weill Cornell Graduate School of Medical Sciences (New York City)
Weill Cornell Medical College (New York City)

† Contract College

[> Top](#) / > [Next Article](#) / > [Back to Listing](#)

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Internet Information Services (IIS)

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