



2001
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From the Vice Provost for Research



Robert C. Richardson

The Cornell faculty is a remarkable group of people. During the past year they have continued to express their innovative dreams in proposals that address an astonishing variety of fields in the natural and social sciences. We, at Cornell, have invented hybrid studies that cross the traditional boundaries of several sciences. At the same time, we have advanced knowledge in specific disciplines with marked achievements. A summary of all that has been achieved cannot be efficiently presented here. Nevertheless, we offer selected examples. Cornell research is always a work in progress. Each year is more progressive than the preceding year. And sometimes, at Cornell, there are advances that move the leading edge further out, creating a new benchmark.

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Cornell scientists will lead three very conspicuous space missions—two to Mars and one to study comets. The CONTOUR mission to study the center of a comet is scheduled for July 2002 (<http://www.contour2002.org>). What these missions have in common is risk—the risk that years of planning could be lost in accidents related to launch.

We have made significant achievements in Cornell's strategic scientific areas: advanced materials and nanoscience, genomics, and information science. For visitors to campus, the most visible realization is the construction of Duffield Hall. Duffield will house major facilities for nanofabrication, including those for the Cornell Nanofabrication Facility (CNF) and the Nanobiotechnology Center (NBTC). In a related achievement, the National Science Foundation (NSF) has awarded Cornell an additional center in nanotechnology, the Center for Nanoscale Systems (CNS).

In response to vigorous faculty interest in Cornell's Genomics Initiative, Cornell will initiate a several-hundred-million-dollar fundraising effort for genomics and modern life science research. In addition, more than \$100 million has been committed for a new life science technologies building. Recruiting faculty for the Genomics Initiative, an ongoing project, has been successful with half a dozen new faculty recruited to Cornell during the past year.

Information science at Cornell has been a highly active area. The new group, Faculty of Computing and Information Science, has made significant appointments in recruiting faculty to Cornell. The thrust in bioinformatics, involving modern biology and information science, has been especially successful. To emphasize this new thrust, the College of Agriculture and Life Sciences has changed the name of the Department of Biometrics to the Department of Biological Statistics and Computational Biology. Our expanded Bioinformatics group is very prominent in national discussions of how to apply copious genomic data to understanding biological function. The Cornell Theory Center continues to thrive with innovative linking of new parallel processing technology. One of the principal digital publishing libraries, physics, was transferred to Cornell during the past year.

A particularly important area of emphasis is technology transfer and economic development. Many Cornell scientists and engineers perform research that has broad applications in society. For several decades the Cornell Research Foundation (CRF) has assisted Cornell faculty in bringing promising ideas to market. Each year CRF invests in intellectual property that has the greatest potential for success through the expensive process of patenting. In order to encourage local and national development of Cornell's intellectual property for use, we have expanded our efforts in marketing inventions. Paul Carey has joined Cornell as the Director of the Office of Economic Development. Carey will coordinate discussions between Cornell inventors and potential investors and developers, both regional and national, in order to form companies that will create products based on Cornell's research.

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American Academy of Arts and Sciences
Jonathan D. Culler, English/Comparative Literature
Antonio M. Gotto Jr., Dean, Weill Cornell Medical College
Thomas D. Seeley, Neurobiology and Behavior
Eva Tardos, Computer Science

Chevalier of the Order of Arts and Sciences
John T.H. Hsu, Music

National Science Foundation Faculty Early Career Development Program
Edwin A. Cowen, Civil and Environmental Engineering
Fernando Escobedo, Chemical Engineering
George G. Malliaras, Materials Science and Engineering
Z. Jane Wang, Theoretical and Applied Mechanics

Office of Naval Research Young Investigator Program
Z. Jane Wang, Theoretical and Applied Mechanics

John Simon Guggenheim Memorial Foundation
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Rebecca Harris-Warrick, Music

Alexander Von Humboldt Research Awards
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Christine A. Shoemaker, Civil and Environmental Engineering

Sloan Foundation Research Fellowships
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Christiane Linster, Neurobiology and Behavior

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| A small biotechnology company in Monterey, CA uses Cornell University discoveries to develop next-generation analytical tools. | |
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| A pioneer in next-generation optical devices using leading-edge semi-conductor innovations is located in Ithaca, NY. | |
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01 [Restoring vision through gene therapy](#)



Gustavo Aguirre (l.) and Gregory Acland (r.)

Gustavo D. Aguirre, Veterinary Medicine, Gregory M. Acland, and colleagues in the **Baker Institute for Animal Health** restored the vision of dogs (the Briard breed), who suffered from an inherited retinal degenerative disease, by treating them with genes from healthy dogs. This is the first successful gene therapy for blindness in a large animal. Mutations in the gene associated with the retinal pigment epithelium, RPE65, cause early vision loss, degeneration of the retinas, and near-total blindness later in life in humans, dogs, and other mammals. The treatment, given to young dogs with congenital stationary night blindness, offers hope for treating a similar childhood disease—Leber congenital amaurosis. Although many safety and efficacy studies still must be done before clinical trials for the gene therapy can begin for human patients, this is an excellent example of how research for animals benefits both animal and human patients.

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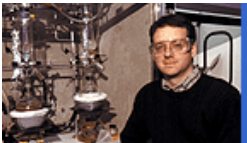




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02 Ushering in a New Class of Plastics



Geoffrey Coates

Geoffrey Coates, Chemistry and Chemical Biology, and his research team discovered a new class of rubbery plastics that could be used for products ranging from roofing to adhesives to shoe soles. The new material uses ethylene and polyethylene, which are common, as its feedstock and would dramatically reduce production costs. Coates made this serendipitous discovery as he was searching for a catalyst—a substance that increases the rate of chemical reaction without changing itself chemically—that would enable the new polymer to be grown from molecules of ethylene and propylene. Coates's new material is in a class of compounds called thermoplastic elastomers. Unlike most rubbers, these can be melted and recycled, and they can be changed from a tough rubber to a soft rubber. The rubbers currently used in this class are polymers made from styrene and butadiene, which are expensive chemicals.

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03 Controlling Insects Naturally




Thomas Eisner

Thomas Eisner, Neurobiology and Behavior, and colleagues discovered that the same chemicals that attract pollinating insects also repel herbivore insects. The chemicals, called DIPs (dearomatized isoprenylated phloroglucinols), color some flowers in bull's eye patterns, which are unrecognizable to human eyes, but can be seen by some insects with ultraviolet vision. The patterns attract some insects and deter or cause the death of others to protect their reproductive apparatus. Although the researchers studied the *Hypericum calycinum* flower, antifeedant chemicals like DIPs are found in other species, such as hops, which are used in beer making. These chemicals have implications for natural insect control agents.

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04 Detecting Galaxy Collisions



Jeremy Darling (l.) and
Riccardo Giovanelli (r.)

Riccardo Giovanelli, Astronomy, and research staff Jeremy Darling, using the radio telescope at **Arecibo Observatory**, discovered 50 extragalactic objects called OH megamasers (radio beacons). An upgrade to Arecibo, the world's most sensitive radio telescope, allows it to pick up strong radio signals emitted when galaxies collide. Astronomers first observed masers (microwave amplification by stimulated emission of radiation) in the Milky Way in 1965, where they are associated with stars shrouded in molecular gas. When galaxies collide, masers can be a million times stronger than regular masers. These are called megamasers. The first known megamaser was discovered in 1982 at Arecibo. OH (oxygen-hydrogen) megamasers may provide clues to understanding the physics of the formation of galaxies. Astronomers can use the OH megamaser detection rate to measure the frequency of galaxy mergers throughout the history of the universe.

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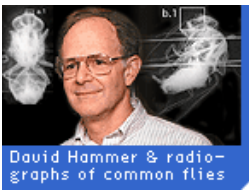




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05 Developing New Imaging Techniques



David Hammer & radio-
graphs of common flies

David A. Hammer, Electrical and Computer Engineering, and colleagues in the **Laboratory of Plasma Studies** produced high-resolution x-ray images of tiny objects such as fly hairs, and living organisms such as ants. What makes these radiographs unique is their extremely fine resolution. They result from X-pinch imaging in which a powerful electrical current is run through a vacuum containing a pair of crossed wires finer than a human hair. This action causes the wires to explode and form a plasma—a dense gas that is so hot that the atoms in it break down. The plasma is called the X-pinch. This new imaging technique could have important applications for medicine or biology. The radiographs also help determine the size of the X-pinch plasma, which is estimated to be less than a thousandth of an inch.

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06 Premiering African Art in Venice



Salah Hassan



Salah M. Hassan, Africana Studies and Research Center/History of Art, and colleague curated a well-reviewed exhibition "Authentic/Ex-centric: Africa In and Out of Africa" at the 49th Venice Biennale (2001) and produced a scholarly companion book, *Authentic/Ex-centric: African Conceptualism in Global Contexts*. The project emphasized the importance of examining reciprocal influences between Africa and the rest of the world. It highlighted current African art practice through work that broaches the issues of representation, memory, Diaspora, expatriation, and other aspects of the African experience. In one work, *Panifce*, a South African artist uses the idea of communion or "breaking bread" to address the universality of human experience across divides of language, culture, or race. In another work, *Vacation*, by a Nigerian-born artist, a family wearing spacesuits made from brightly colored traditional African textiles takes a stroll on the moon. This seems to imply human progress, however, the work suggests that one can embody the paradox of alien/other and colonial/explorer, demonstrating the complexity of power dynamics among groups. The companion book offers essays that present a fresh look at conceptualism from an African standpoint and at issues of cross-cultural and transnational aesthetics.

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07 Preventing Cocaine Poisoning



George Hess, Yan Shang,
and Armanda Gameiro

George P. Hess, Biochemistry/Molecular Biology and Genetics, and research team developed a new technique—laser-pulse photolysis—which led to the discovery of compounds involving RNA that could provide treatment for cocaine poisoning. The new technique may have implications for nerve cell reactions in diseases such as epilepsy and Parkinsonism, as well. Hess synthesized artificial RNA compounds that prevent cocaine from blocking proteins essential for normal functioning of the nervous system. Laser-pulse photolysis let researchers study the electrochemical activity of the protein—active only for a few milliseconds—in the effort to find compounds that would prevent cocaine from blocking these crucial proteins for brain function. Identification of the RNA compounds enables the design of smaller and more stable compounds for treating cocaine poisoning. Cocaine abuse affects approximately 5 million users in the U.S. and costs many billion dollars every year to deal with it.

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08 Using Wasps to Control Pests



Michael Hoffmann

Michael P. Hoffmann, Entomology/Integrated Pest Management Program, and research colleagues discovered that wasps—small *T. ostriniae*— released early and only once during the sweet corn growing season would control the European corn borer. Field tests showed that using this method of biological control would reduce by half the damage to ears of corn. This new research revealed that it is not necessary to release the wasps throughout the summer growing season in large numbers. The wasps are egg parasitoids—the females insert their eggs into the corn borer eggs, killing the borer embryos. The European corn borer attacks fields of sweet corn, costing producers in New York and other Northeastern and Midwestern states about \$1 billion a year. The cost of releasing wasps—about 30,000 per acre—is less than a single application of insecticide.

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09 Producing an Award-Winning Vegetable



Molly Jahn and Cornell's Bush Delicata squash

Molly Jahn, Plant Breeding, bred Cornell's Bush Delicata, a squash with cream-color skin and forest-green stripes. It is the first Cornell University-developed variety to win the prestigious All-America Selection in 39 years. This seed industry award is the highest honor bestowed on a vegetable variety in North America. Cornell's Bush Delicata is not a hybrid. It is an open-pollinated variety, which means that the seed can be saved. Although the delicata was popular during the early twentieth century, it was hampered by poor yields and susceptibility to disease.

Cornell's Bush Delicata has excellent eating quality—a sweet, nutty heirloom flavor—and it is disease resistant. It also has a long shelf life—about 100 days.

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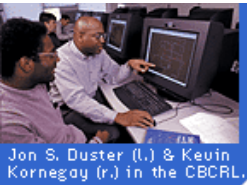
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10 Advancing Research in Wireless Communications



Jon S. Duster (l.) & Kevin Kornegay (r.) in the CBCRL.

Kevin T. Kornegay, Electrical and Computer Engineering, directed the opening of the **Cornell Broadband Communications Research Laboratory (CBCRL)**, organizing a unique industry/academia partnership to support it. The facility is a state-of-the-art laboratory used for the design and testing of radio-frequency (RF) integrated circuits, such as transceivers in cellular phones and other wireless devices, and for training future RF engineers. Kornegay designed a hands-on laboratory course in RF integrated circuit design targeting new Bluetooth devices—an industry standard that allows cell phones, computers, personal digital assistants, and other applications to communicate with one another. Students design chips in the fall semester, the chips are manufactured over semester break, and then students test and evaluate chips and give oral and written reports in the spring semester. The laboratory serves the critical need for well-trained RF circuit designers, particularly in the northeast U.S. The laboratory also supports Kornegay's research in wireless communications system design, which aims to reduce size and power requirements.

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11 [Finding New Therapies for Heart Attacks](#)



Roberto Levi
and Randi Silver

Roberto Levi and Randi Silver, Weill Cornell Medical College, and colleagues showed that the activation of a histamine receptor, the H₃-receptor, limits the release of noradrenaline, which causes arrhythmias (disturbances of the heartbeat). When heart attacks strike, the nerve endings in the heart release excessive amounts of the neurotransmitter, noradrenaline, leading to arrhythmias, which could be fatal. With guinea pigs and human cell lines, the researchers demonstrated this critical role of the H₃-receptor in limiting the release of noradrenaline, based on the ability of the H₃-receptor to modulate intracellular levels of calcium and sodium. The research could lead to new drugs that stimulate the H₃-receptor exclusively in the heart and peripheral nervous system. Although there are other drugs that can be taken at the time of a heart attack, stimulants of the H₃-receptor may not have the problematic side effects of other drugs.

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12 Examining Mandatory Food Labeling



Alan Mathios
at Wegman's

Alan D. Mathios, Policy Analysis and Management, found that mandatory food labeling influences the sales of high-fat foods. In a study to show how nutrition labels affect consumer choices, Mathios discovered that sales of high-fat salad dressings declined about 5 percent. The study consisted of data of salad dressings purchased before and after the Nutrition Labeling and Education Act mandatory labeling law of 1994. Before the law, high-fat, unlabeled salad dressings accounted for 75 percent of all salad dressings purchased by the least educated shoppers and 50 percent by the most educated shoppers. The results of the study have significant policy implications, since the top causes of death in the U.S. are related to diet.

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13 Finding Upstate New York Family-Friendly



Phyllis Moen

Phyllis E. Moen, Human Development/Sociology, and colleagues in the **Cornell Careers Institute** conducted a study that revealed Upstate New York as a family-friendly region. Families cite moderate cost of living, safety, job opportunities, proximity to jobs, and community amenities such as parks, libraries, and public events as top reasons for choosing Upstate New York. The study found that the standard of living a \$50,000 annual income buys in Rochester, NY, costs \$75,000 in Los Angeles and \$104,000 in Manhattan. The study's purpose was to gain insight into how workplaces, policies, and services promote or impede family-friendly environments in the region.

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14 [Discovering Size Matters](#)



Karl Niklas

Karl J. Niklas, Plant Biology, and University of Arizona colleague used mathematical modeling to show that universal scaling laws apply to the plant world just as they do to the animal kingdom. Scientists have known for more than a century that scaling exists in animals, but only recently have they considered that size matters throughout nature. Niklas discovered a fourth spatial dimension in plants—a relationship of mass to width, length, and depth. Just as a scaled-up giant ant with the same proportions as a smaller counterpart could not function, the same is true for plant life. This discovery could influence environmental and ecological policy and evolutionary biology research. Plant scientists in the future will be able to develop mathematical models to make predictions about standing forest biomass, growth, and related predictions.

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15 Wearing Fungus-Harboring Fabrics in Hospitals



Kay Obendorf and Cotton Fiber with *Aspergillus*

Kay Obendorf, Textiles and Apparel, and research staff conducted a study that revealed clothing worn by visitors and patients in hospitals is a leading carrier of *Aspergillus*—a common airborne mold fungus. *Aspergillus* spores can cause dangerous infections, such as the lung disease pulmonary aspergillosis, in hospital patients with damaged or impaired immune systems—for example leukemia, chemotherapy, organ and marrow transplant, and AIDS patients. Any physical contact with the patient or just walking into a patient's room dislodges spores from clothing. Cotton fabric was shown to be the leading harbor of *Aspergillus* spores, however wool is equally suspect. Although many hospitals use HEPA (High Efficiency Particulate Air) filters in rooms of these patients, staff and visitors can easily recontaminate the rooms. The researchers found that laundering is highly effective in removing spores. The risk of infections could be greatly reduced by having staff and visitors cover their clothing with hospital-laundered garments and shoe covers before entering a patient's room.

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16 Connecting Pregnancy and Obesity



Christine Olson

Christine M. Olson, Nutritional Science, found in a study that excessive weight gain during pregnancy contributes significantly to escalating obesity rates in the U.S. Women who gain more than the recommended weight in pregnancy are four times more likely to be obese one year after giving birth, compared to women who stayed within recommended guidelines of the Institute of Medicine. The study showed that more than 40 percent of the women studied gained more weight than recommended during pregnancy, and one-fourth of all pregnant women studied were at least 10 pounds heavier one year after giving birth. Prior to this study, researchers had not known that the effects of gestational weight gains were this substantial and contributed as much to obesity. Following this study, the Centers for Disease Control reported that obesity rates have risen nearly 60 percent in the U.S. since 1991. Obesity increases the risks of chronic health problems such as diabetes and cardiovascular disease.

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17 [Growing New Nerve Cells](#)



Mark Saltzman

W. Mark Saltzman, Chemical Engineering, and research staff demonstrated a technique for transplanting clusters of brain cells with controlled-release microcapsules of proteins to enable cell differentiation and growth. The researchers tested the system by implanting rat fetal brain cells and nerve growth factor (NGF) in the brains of adult rats. It is a clear corroboration that brain cells can survive and differentiate when preassembled with NGF-released particles. Although the technique has not been tested on humans, it is adaptable to various transplantation needs. Saltzman's laboratory is particularly interested in the transplantation and regeneration of cells in the nervous system, including the brain, where the body cannot produce new cells after the fetal stage. A local delivery system within a microenvironment, such as this new technique, could be used to treat neurodegenerative disease and spinal cord injuries.

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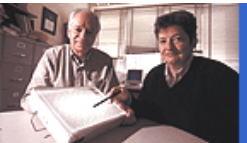
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18 [Creating Nanobumps](#)



Stephen Sass (l.)
and Melissa Hines (r.)

Stephen Sass, Materials Science and Engineering, and Melissa Hines, Chemistry and Chemical Biology, discovered a new etching process for producing silicon structures as small as 10 nanometers. The process, controlled etching of dislocations (CED), made an array of features on a silicon surface which the researchers called "nanobumps." They were columns 25 nanometers across (about 75 atoms) and six times smaller than the width of the smallest component of a commercial microprocessor. Optical lithography, used by the microelectronics industry

to make microscopic devices such as computer circuitry, has not been able to produce features smaller than 150 nanometers in width. This new process has potential for manufacturing structures at the scale of biologically important molecules, such as human antibodies, and for developing a range of devices from biological sensors to light-emitting silicon displays.

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19 Reaping High Profits through Integrity




Tony Simmons

Tony L. Simons, Hotel Administration, and Washington University colleague established that hotels where employees report managers as having integrity—managers' words match their deeds—reap substantially higher profits. Employees are more committed to the company, which leads to better employee retention and customer service. The uniqueness of the study is that it revealed that even small improvements in managers' integrity (one-eighth of a point in the behavioral integrity score of a manager) led to much higher profits, 2.5 percent of revenues. This accounts for more than \$250,000 for the bottom line of an average full-service hotel. For an industry that averages 20 to 30 percent profit on revenues, this is a big boost. The researchers hold that the effect also applies to other businesses.

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20 Questioning Abstinence-Only Sex Education



Gary Simson

Gary J. Simson, Law, and research staff conducted a constitutional analysis in which they evidenced abstinence-only sex education to be unconstitutional because it endorses a religious agenda. Thirty-five percent of public schools with a district-wide policy to teach sex education require courses in abstinence-until-marriage for teens. The researchers maintained that abstinence-only programs violate the First Amendment's "Establishment Clause," which bans laws with the purpose or effect of endorsing religion. The abstinence-only curriculum widely used in the U.S., "Sex Respect," is identified with the Christian Coalition. According to a recent study, the greater majority of U.S. parents want a comprehensive sex education program that encompasses discussions of abstinence along with birth control methods, AIDS prevention and detection, and other topics covering a full range of teens' sexual concerns. Proponents of comprehensive sex education have lobbied legislatures and school boards to reject abstinence-only programs.

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21 Studying Family Disruptions



Elaine Wethington

Elaine Wethington, Human Development, in a study on social support networks and family conflicts in adulthood, found that the perception of strong social support networks accounted for good physical and mental health among men and women. These men and women reported cheerfulness, satisfaction, and little or no depression in their lives. The study also revealed that childhood family disruptions—such as parental divorce, long-term separation from biological parents, parental abandonment, and foster care—could cause problems in interpersonal relationships later in life, particularly among women. Family disruptions are strongly related to negative moods and feelings in adulthood, along with perceptions of having fewer social supports. The research indicates that measuring and accounting for events subsequent to the family disruption, from childhood to early adulthood, is a useful area for further research.

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22 [Perpetuating Mating Strategies](#)



Kelly Zamudio and
Uta Stansburiana lizards

Kelly R. Zamudio, Ecology and Evolutionary Biology, and University of California-Santa Cruz colleague determined why nature allows all mating strategies to persist in some animal systems. Just as in the rock-paper-scissors children's game, each of the three genetic strategies has an advantage over one competitor and a vulnerability to another. Therefore, all of them have an equal opportunity to succeed. Studying side-blotched lizards (*Uta stansburiana*), the researchers described the three sexual strategies: (1) the aggressive male with lots of females in a big territory, (2) the loyal male who guards a single mate in a small territory, (3) the landless loner who sneaks into other males' territories and mates with their females. Although some species of birds and fishes have similar mating strategies, this reptilian system is almost unique in the animal kingdom. Evolutionary biologists know of few similar systems in mammals.

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01 Fredric V. Bogel, English



Fredric Bogel



The Difference Satire Makes: Rhetoric and Reading from Jonson to Byron (Cornell University Press, 2001). Analyzing Augustan satiric texts, Bogel provides the first extensive assessment of the satiric mode in almost half a century. He re-evaluates the structure of the satiric mode, accepting that satire is based on tension between the satirist and the satiric object, but he adds intimacy and identification to the relationship, establishing a new theory of satire. He asserts that satire must establish or produce difference.

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02 Peter R. Dear, History



Peter Dear

Revolutionizing the Sciences: European Knowledge and Its Ambitions, 1500-1700 (Princeton University Press, 2001). This accessible introduction to the origins of modern science in Europe presents ideas, individuals, and social changes that comprised the Scientific Revolution. Covering the sixteenth and seventeenth centuries, Dear gives an account of some of the basic issues in natural philosophy.

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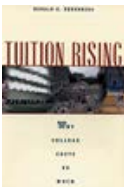
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03 Ronald G. Ehrenberg, Industrial and Labor Relations/Economics



Tuition Rising: Why College Costs So Much (Harvard University Press, 2000). Ehrenberg explores reasons for rising tuition costs at select private colleges and universities in the U.S. Competing for the best students and faculty, shared governance (trustees, administrators, and faculty), and the impact of college rankings such as the U.S. News and World Report are among the reasons he cites. Ehrenberg offers suggestions such as the same

fiscal discipline imposed on public institutions, shared resources among academic institutions, and financial aid for academically qualified students who otherwise could not attend the select institutions. Tuition costs at these institutions have risen faster than the national rate of inflation, with tuition, fees, room, board, and expenses exceeding \$30,000 a year.

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04 James Garbarino, Human Development, and Claire Bedard



James Garbarino



Parents Under Siege: Why You Are the Solution, Not the Problem, in Your Child's Life (The Free Press, 2001). The authors offer strategies to help parents assess and find solutions for children's difficult behaviors, such as self-destruction and antisocial behavior. They provide tools that parents can use to identify if they are raising a challenging child and ways to steer the child in positive directions.

They explain how parents can become authority figures in their child's life in a world suffering from the social effects of television, video games, and the Internet along with the glorification of drugs and violence. The authors conducted interviews with many parents, including the only interviews with the parents of Columbine school shooter, Dylan Klebold.

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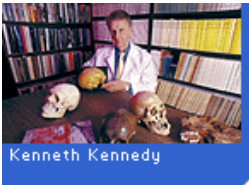
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05 Kenneth A.R. Kennedy, Ecology and Evolutionary Biology



Kenneth Kennedy



God-Apes and Fossil Men: Paleoanthropology of South Asia (University of Michigan Press, 2000). Kennedy, who has excavated and analyzed human skeletal remains, presents an engagingly accessible, comprehensive picture of human evolution, biological diversity, and human culture in South Asia (India, Pakistan, Sri Lanka, Burma, and Afghanistan). The culmination of 40 years of research in physical anthropology, Kennedy integrates data from archaeological, paleontological, ecological, and anthropological work. The book is hailed as an enjoyable introduction for anyone who wants to know more about this region of the world.

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06 Ronald R. Kline, Science and Technology Studies/Electrical and Computer Engineering



Ronald Kline



Consumers in the Country: Technology and Social Change in Rural America (Johns Hopkins University Press, 2000). The telephone, automobile, radio, and electric light and power were urbanizing technologies that transformed rural America from 1900-1960. According to Kline, this transformation was not the result of passive consumers whose lives were changed in a predictable manner. Kline investigates the interactions between those who promoted the technologies (manufacturers

and government agencies) and the farm families (consumers). He concludes that farm people used the technology in innovative ways and created new forms of rural life and new forms of modernity.

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07 [José Edmundo Paz-Soldán and Debra A. Castillo, Romance Studies](#)



Latin American Literature and Mass Media (Garland Publishing Inc., 2001). In this collection of articles, the editors examine Latin American literature in the context of a contemporary audiovisual culture dominated by mass media such as photography, film, and the Internet. The collection critically assesses Latin American media theories and shows how literary works, particularly novels, have sustained visibility in a highly competitive media ecology. The volume analyzes how authors of fictional works have engaged the mass media and mass culture, using their narratives as powerful aesthetic tools to represent their own media multiplicity.

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08 Annette Richards, Music



The Free Fantasia and the Musical Picturesque (Cambridge University Press, 2001). Richards explores the late-eighteenth-century free fantasia and its relationship to the aesthetics of landscape and the picturesque. She examines the ways in which musical fantasy relied on concepts borrowed from the art of the landscape garden, for example. She shows how the surprising disjunction of musical fantasies—improvisations and their composed imitations—were legitimated and justified via the aesthetics of the picturesque. The picturesque's characteristic obsession with variety, intricacy, and sudden interruptions provided late-eighteenth and early-nineteenth-century commentators with a richly productive analogy for the free fantasia.

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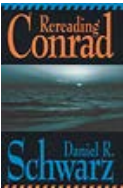
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09 Daniel R. Schwarz, English



Rereading Conrad (University of Missouri Press, 2001). This collection of essays reflects Schwarz's research since his last two books on Conrad. Although this work touches on the entire Conrad canon, the focus is on the masterworks, *Heart of Darkness*, *Lord Jim*, *Nostramo*, and "The Secret Sharer." Schwarz tests claims of recent theory in each essay, showing how reading Conrad has changed over the past two decades—influenced by gender, postcolonial, and cultural studies.

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10 Paul W. Sherman, Neurobiology and Behavior, and Gail Jarro



individuals perpetuate their own genes by staying home to care for other young animals. They learn parenting skills that are useful when an opportunity comes for them to breed. By making the science accessible to children, the authors create a curiosity about some of the mysteries of biology, thus encouraging future scientists.

Animal Baby Sitters (Franklin Watts, 2001). Using some of his latest research on cooperative breeding, Sherman brings the excitement of behavioral biology to young readers. In this children's book, he tackles the mystery of why some animals postpone starting a family in order to help care for others. Sherman and colleagues conducted repeated studies among different species of animals and found that when opportunities are limited for breeding,

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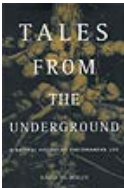
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11 David W. Wolfe, Horticulture



Tales from the Underground: A Natural History of Subterranean Life (Perseus Books, 2001). This is an animated story of critters, scientists, and the intertwining of nature and humanity. Wolfe explains how life beneath us—such as microbes down to 10 feet below the surface—works together with all of nature. For example, extremophiles, microbes that exist without oxygen or sunlight and at temperatures beyond water's boiling point, are useful in remediating soil contaminated by oil spills and chemical dumping. Prairie dogs keep grasses trimmed to specific heights; and when the prairie dog population was reduced (because they were pests to landowners), the black-footed ferret became rare in North America because of a sparse food supply. The author also explores the relationship of soil, plants, and roots. The book has significance for current research directions in biogeochemistry.

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American Philosophical Society
Robert C. Richardson, Physics/Vice Provost for Research

American Academy of Arts and Sciences
Jonathan D. Culler, English/Comparative Literature
Antonio M. Gotto Jr., Dean, Weill Cornell Medical College
Thomas D. Seeley, Neurobiology and Behavior
Eva Tardos, Computer Science

Chevalier of the Order of Arts and Sciences
John T.H. Hsu, Music

National Science Foundation Faculty Early Career Development Program
Edwin A. Cowen, Civil and Environmental Engineering
Fernando Escobedo, Chemical Engineering
George G. Malliaras, Materials Science and Engineering
Z. Jane Wang, Theoretical and Applied Mechanics

Office of Naval Research Young Investigator Program
Z. Jane Wang, Theoretical and Applied Mechanics

John Simon Guggenheim Memorial Foundation
Joseph Y. Halpern, Computer Science
Rebecca Harris-Warrick, Music

Alexander Von Humboldt Research Awards
Thomas D. Seeley, Neurobiology and Behavior
Christine A. Shoemaker, Civil and Environmental Engineering

Sloan Foundation Research Fellowships
Yuri Berest, Mathematics
Christiane Linster, Neurobiology and Behavior

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Transferring Technology

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A small biotechnology company in Monterey, CA uses Cornell University discoveries to develop next-generation analytical tools.
- 02 [BinOptics Corporation](#)
A pioneer in next-generation optical devices using leading-edge semi-conductor innovations is located in Ithaca, NY.
- 03 [Transferring Technology, Statistics FY 2001](#)

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01 Aegen Biosciences, Inc.



Michael Shuler
and Gregory Baxter

Aegen Biosciences, Inc., a small biotechnology company in Monterey, CA, uses Cornell University discoveries to develop next-generation analytical tools for toxicology, drug discovery, drug development, pharmacogenomics, and clinical diagnostics. Aegen is developing an animal-on-a-chip device based on technology invented at Cornell by Michael L. Shuler, Chemical Engineering, and Gregory T. Baxter, formerly senior research associate, now president/CEO of Aegen.

Commercialization of the technology has the potential to increase the success rates and decrease the development time of marketable drugs, while greatly reducing the number of animals used during preclinical studies.

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02 BinOptics Corporation



BinOptics Corporation, located in Ithaca, NY, is based on research done at Cornell University. This privately held company was funded by renowned Silicon Valley venture firm, Draper Fisher Jurvetson. BinOptics is a pioneer in next-generation optical devices using leading-edge semiconductor innovations. Focused on optical research, BinOptics is developing optical logic that can be used in optical circuits.

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03 Transferring Technology, FY 2001

| | | |
|---------------------------------------|----------------|-----|
| Invention Disclosures | | |
| Disclosures Received | | 190 |
| Dropped | | 26 |
| Filed | | 64 |
| U.S. Patents | | |
| Applications Filed | | 214 |
| Applications Pending | | 429 |
| Patents Issued | | 115 |
| Patents in Force | | 475 |
| Foreign Patents | | |
| Applications Filed | | 73 |
| Applications Pending | | 668 |
| Patents Issued | | 12 |
| Patents in Force | | 185 |
| Licenses | | |
| Licenses and Options Executed | | 76 |
| Total Equity Deals with Startups | | 25 |
| Active Licenses | | 669 |
| License Income | | |
| Gross Income | \$12.3 million | |
| Royalties Paid to Inventors | \$3.4 million | |
| Royalties Paid to Cornell Colleges | \$2.0 million | |
| Royalties Paid to the University | \$1.1 million | |

Source: Cornell Research Foundation, Office of Patents and Technology Marketing

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01 Funding Cornell's Research, FY 2001

By Dollars Expended

| | FY 2000 | FY 2001 |
|-----------------------------------|---|-----------|
| | Dollars in Thousands | |
| Sources | | |
| Total Research Expenditures | \$396,909 | \$414,629 |
| Total Federal Sources | 241,639 | 253,094 |
| Sponsored | 236,469 | 247,588 |
| Budgeted | 5,170 | 5,506 |
| Total Non-Federal Sources | 155,270 | 161,535 |
| Sponsored | 65,302 | 78,906 |
| State & Local Governments | 9,654 | 13,257 |
| Corporations & Trade Associations | 12,702 | 21,201 |
| Foundations | 16,649 | 18,097 |
| Non-Profit Organizations | 21,828 | 22,085 |
| All Others | 4,469 | 4,265 |
| Budgeted | 89,968 | 82,629 |
| Cornell | 59,068 | 49,678 |
| New York State | 30,900 | 32,951 |
| Federal Agencies | | |
| DHHS | Department of Health & Human Services | \$122,480 |
| NSF | National Science Foundation | 76,872 |
| DOD | Department of Defense | 18,168 |
| NASA | National Aeronautics Space Administration | 9,339 |
| USDA | Department of Agriculture | 11,856 |
| DOE | Department of Energy | 4,412 |
| | All Others | 4,462 |

Source: Cornell University, Office of Sponsored Programs.
Any discrepancies are due to rounding.

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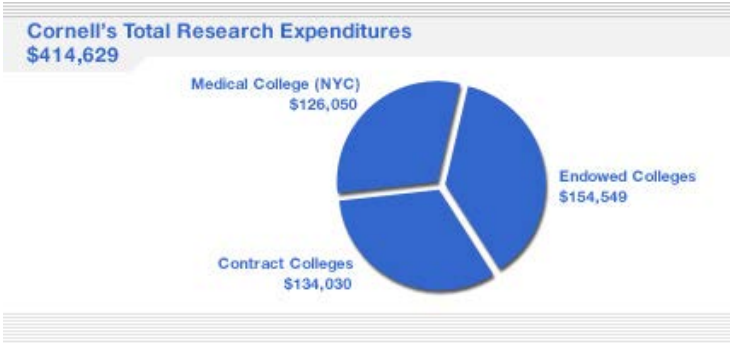


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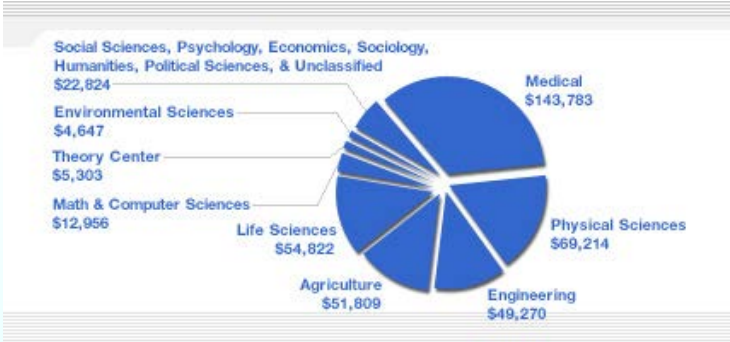
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02 Expending Research Dollars, FY 2001

By Cornell Divisions
Dollars in Thousands



By Disciplines
Dollars in Thousands



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

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03 Ranking Cornell Nationally

By Research Expenditures, FY 2000

| | Research Expenditures ¹ Dollars in Thousands |
|---|--|
| University of Wisconsin, Madison | \$554,361 |
| University of Michigan | 551,556 |
| University of California, Los Angeles | 530,826 |
| University of Washington | 529,342 |
| University of California, San Diego | 518,559 |
| University of California, Berkeley | 518,514 |
| Stanford University | 454,780 |
| University of California, San Francisco | 443,013 |
| University of Pennsylvania | 430,389 |
| Pennsylvania State University | 427,575 |
| Massachusetts Institute of Technology | 426,299 |
| University of Minnesota | 411,380 |
| Cornell University | 410,393 |
| Texas A&M University | 397,268 |

Source: National Science Foundation
¹ These dollars do not include R&D expenditures at university-associated, federally funded research and development centers. NSF also adds estimated unrecovered indirect costs, as reported by institutions, to totals.

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04 Ranking Cornell in New York

By Research Expenditures, FY 2000

| | Research Expenditures ¹ Dollars in Thousands |
|------------------------------|--|
| Cornell University | \$410,393 |
| Columbia University | 319,693 |
| University of Rochester | 197,335 |
| SUNY Buffalo | 187,692 |
| New York University | 182,205 |
| SUNY Stony Brook | 163,307 |
| Mt. Sinai School of Medicine | 149,846 |
| Yeshiva University | 139,618 |
| The Rockefeller University | 124,138 |
| SUNY Albany | 82,792 |

Source: National Science Foundation
¹ These dollars do not include R&D expenditures at university-associated, federally funded research and development centers. NSF also adds estimated unrecovered indirect costs, as reported by institutions, to totals.

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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 Nanofabrication Facility*
Nanobiotechnology Center

Environment

Center for the Environment
Institute for the Study of the Continents
Multidisciplinary Center for Earthquake Engineering Research

Medical Research

AIDS Clinical Trials Unit
Burn Center
Cardiovascular Center
Center for Reproductive Medicine and Infertility
Center for Vascular Biology
Chrono-biology/Sleep-Wake Disorders Center
Dyson Vision Research Institute
Hypertension Center
Institute of Genetic Medicine

Life Sciences

Agricultural Experiment Stations (Geneva; Ithaca)
Baker Institute for Animal Health
Comparative Cancer Program
Cornell International Institute for Food, Agriculture, and Development
Institute for Genomic Diversity
Institute for Biotechnology and Life Science Technologies
Institute of Food Science
Plant Science Center

Physical Sciences and Engineering

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 of Elementary-Particle Physics*
National Astronomy and Ionosphere Center*

Social Sciences and Humanities

Africana Studies and Research Center
Bronfenbrenner Life Course Center
Center for Analytic Economics
Cornell Institute for Research on Children
Cornell Institute for Social and Economic Research
Program on Ethics and Public Life
Institute for Women and Work
Einaudi Center for International Studies
Society for the Humanities

Business/Management

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

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*National Center

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| 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 |
| 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

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