Yale University Financial Report 2002–2003

www.yale.edu/fro2-03

Highlights

Five-Year Financial Overview ($ in millions)	Fiscal years 2003	2002	2001	2000	1999
Budget Activity Surplus (Deficit)	$ —	$ —	$ —	$ —	$0.7
Financial Position Highlights:					
Total assets	$14,257.4	$13,358.8	$13,268.7	$12,370.0	$9,347.4
Total liabilities	2,029.3	1,624.1	1,393.6	1,416.2	1,336.6
Total net assets	$12,228.1	$11,734.7	$11,875.1	$10,953.8	$8,010.8
Endowment:					
Total investments	$11,048.9	$10,522.6	$10,733.3	$10,092.3	$7,221.7
Total return on investments	8.8%	0.7%	9.2%	41.0%	12.2%
Spending from endowment	4.5%	3.8%	3.4%	3.9%	3.9%
Facilities:					
Land, buildings and equipment, net of accumulated depreciation	$1,986.1	$1,853.2	$1,582.5	$1,354.5	$1,197.4
Disbursements for building projects	207.6	328.2	282.0	191.3	172.8
Debt:					
For facilities improvements	$1,543.9	$1,193.8	$994.3	$1,028.3	$989.9
For student loans and other	29.0	29.5	29.5	45.6	45.6
Statement of Activity Highlights:					
Operating revenue	$1,553.7	$1,472.2	$1,352.9	$1,262.1	$1,149.5
Operating expenses	1,543.1	1,427.0	1,334.9	1,282.0	1,129.9
Increase (decrease) in net assets from operating activities	$10.6	$45.2	$18.0	($19.9)	$19.6

Five-Year Enrollment Statistics	2003	2002	2001	2000	1999
Student Fees:					
Yale College term bill	$35,370	$34,030	$32,880	$31,940	$30,830
Freshmen Enrollment:					
Freshmen applications	15,466	14,809	12,887	13,270	11,947
Freshmen admitted	2009	2,038	2,084	2,135	2,100
Admissions rate	13.0%	13.8%	16.2%	16.1%	17.6%
Freshmen enrollment	1,300	1,296	1,352	1,371	1,299
Yield	65.6%	64.7%	66.4%	65.0%	63.0%
Total Enrollment:					
Yale College	5,307	5,270	5,335	5,340	5,411
Graduate and professional schools	5,853	5,762	5,579	5,512	5,455

Front cover:
Research associate **Irene Kasumba**, Postdoctoral fellow **Dana Nayduch**, and postgraduate associate **Youjia Hu** are screening bacterial colonies with tsetse DNA fragments in Professor Serap Aksoy's laboratory at the Department of **Epidemiology and Public Health.**

Back cover:
The 457,000 square foot **Anlyan Center for Medical Research and Education**, dedicated in May 2003, contains research facilities for about 700 laboratory scientists, state-of-the-art space for the teaching of anatomy and histology, and a center for advanced research in magnetic resonance imaging and spectroscopy. It is named after benefactors Dr. A. John Anlyan '42 B.S., '45 M.D. and Betty Jane Anlyan.

Message from the Acting Vice President for Finance and Administration

President Levin has made a significant commitment to enhancing the University's standing as one of the world's premier research institutions in the fields of science and technology. As described in this annual report, Yale is making major investments in programs and facilities in science, medicine, and engineering to support the University's current distinction in the sciences. A byproduct of this work is a growing biotechnology industry located near the University, a result of Yale's success in technology transfer efforts and one of the important ingredients in the renaissance of New Haven.

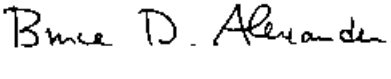
In fiscal year 2003, the University's operating and investment results demonstrated continued resiliency in the less than robust economic environment confronting higher education. Yale balanced its budget by keeping spending within the limits of available resources. While contributions and interest income declined, there were increases in operating revenues from sponsored agreements, medical services, and the endowment which returned 8.8%, provided $470 million to operating activity, and grew to $11 billion for the first time in Yale's history.

Capital spending for fiscal year 2003 was $207.6 million, principally for research and student facilities. A major new research complex, the Anlyan Center for Medical Research and Education at the School of Medicine, was finished this year. Completion of the financing for this facility included a significant gift from Dr. A. John Anlyan '42 B.S., '45 M.D. and Betty Jane Anlyan. This 457,000 square foot building will allow Yale to maintain its position as one of the top recipients of life sciences research grants in the nation. The renovation of Yale's residential colleges also continued with the completion this year of the $63.4 million Timothy Dwight College project. To help fund this continuing investment in physical infrastructure, the University's debt load, which increased by $350 million during the year, is expected to grow. Management views the tax-exempt bond market as a prudent vehicle to finance these investments, but remains cognizant of the impact that the increase in debt has on operations and overall financial position. The University's debt to net assets ratio remains strong and will continue to be closely monitored.

With respect to administration, a major effort was initiated to improve management efficiency, streamline business practices, and reduce expenditures not directed to teaching and research. In September of 2003, the University and its two unions settled contract negotiations, with the Union membership receiving competitive wage and pension increases and the University an unprecedented eight-year agreement, an extended contract period which will be used to improve labor-management relations. In October 2003, the University issued Standards of Business Conduct, a statement that articulates the ethical and legal principles that have long governed business dealings by faculty and staff. It reflects the values to which Yale subscribes, and identifies the documents that set forth the University policies that address these matters. All faculty and staff have been encouraged to review this new statement, consider it carefully, and continue to act in accordance with its underlying principles and policies.

Yale continues to strive to preserve and enhance its human, financial, and physical capital to ensure that the University has the resources available to fulfill its mission of acquiring and transmitting knowledge, and of preparing our students for service and leadership roles in society. Yale seeks to create a productive environment for its employees and provide financial incentives to attract and retain the finest research, teaching, and administrative staff. The University's financial capital has in recent years been enhanced by the superior results of the management of the endowment, and the maintenance and improvement of our physical environment, the magnificent campus which supports research and learning, continues to be a priority of this administration.

We are most grateful for the dedication of faculty, students, staff, trustees, alumni, and friends who work together to make Yale a preeminent institution and to ensure the University's continuing excellence for future generations.



Bruce Donald Alexander '65
Acting Vice President for Finance and Administration

A changing world, grounded in science

Susan Hockfield, the William Edward Gilbert Professor of Neurobiology, is the first basic scientist to serve as Provost of the University. Scientific literacy, she says, will be a key qualification for the next generation of leaders in academia, industry and public life.

As the University begins its fourth century, the next generation of the leaders it produces will need a strong footing in the sciences. Yale is assembling the intellectual capital – and providing the infrastructure – to help answer the large, complex questions that society will confront.

At the time of Yale's founding in 1701, a well-educated person would have had at least a passing interest in science and could be expected to know something about natural history, botany, astronomy, and chemistry, and perhaps a bit of physics as well. But a thorough grasp of science was far from required for leadership in most endeavors, including political and civic life.

As recently as a generation ago, the relation of science to public discourse remained essentially unchanged. Through the second half of the twentieth century, a citizen – or, for that matter, a head of state – could well understand the implications of the nuclear age without comprehending the scientific principles of nuclear physics. As the twenty-first century opens, however, it is no longer possible to appreciate the political and economic consequences of newly emerging technologies without at least a basic understanding of their underlying scientific principles. A compelling example can be found in the debate over the potential benefits and dangers of bio-engineered food products, a conversation that cannot be joined intelligently without an appreciation of the science behind genetic engineering.

"The world leaders of tomorrow," says Susan Hockfield, Provost of the University and the William Edward Gilbert Professor of Neurobiology, "must be conversant in science and confident of their ability to understand the basic principles and the language of evolving technologies." Moreover, they will be relying on new knowledge created at institutions such as Yale to guide them in making informed and wise decisions.

Given this new paradigm, and given Yale's tradition of producing leaders in virtually every sphere, the University has recognized the growing importance of science and technology in a liberal arts education and is investing an unprecedented $1 billion to support increased scholarship and teaching in these areas. Building strength in the sciences is ever more critical to Yale's continued preeminence among research universities in the United States and the world. This commitment is intended to produce better research, a richer academic environment and an improved curriculum, not only for science students but also for all students whose knowledge of science will be an essential part, if not the focus, of their undergraduate or graduate education.

"No investment is more important to securing Yale's position among the world's leading universities," says Yale President Richard C. Levin, "and no investment holds greater promise for the health and prosperity of the nation and the planet."

As Yale embarks on its fourth century, it is embracing innovative research and teaching in the physical and biological sciences, engineering, and the environment. In addition, the University is encouraging collaborations large and small that cross traditional department lines and draw on the insights of diverse fields. This broad approach to complex problems in science is gaining momentum at a time when the boundaries separating many basic disciplines are beginning to blur. As we discover more about the physical and chemical properties of molecules, the nature of human inheritance, and the application of scientific knowledge for improved health and a sustainable future, a common vocabulary is evolving among investigators at Yale and around the world. The four examples of interdisciplinary collaboration that follow draw heavily on this common language.

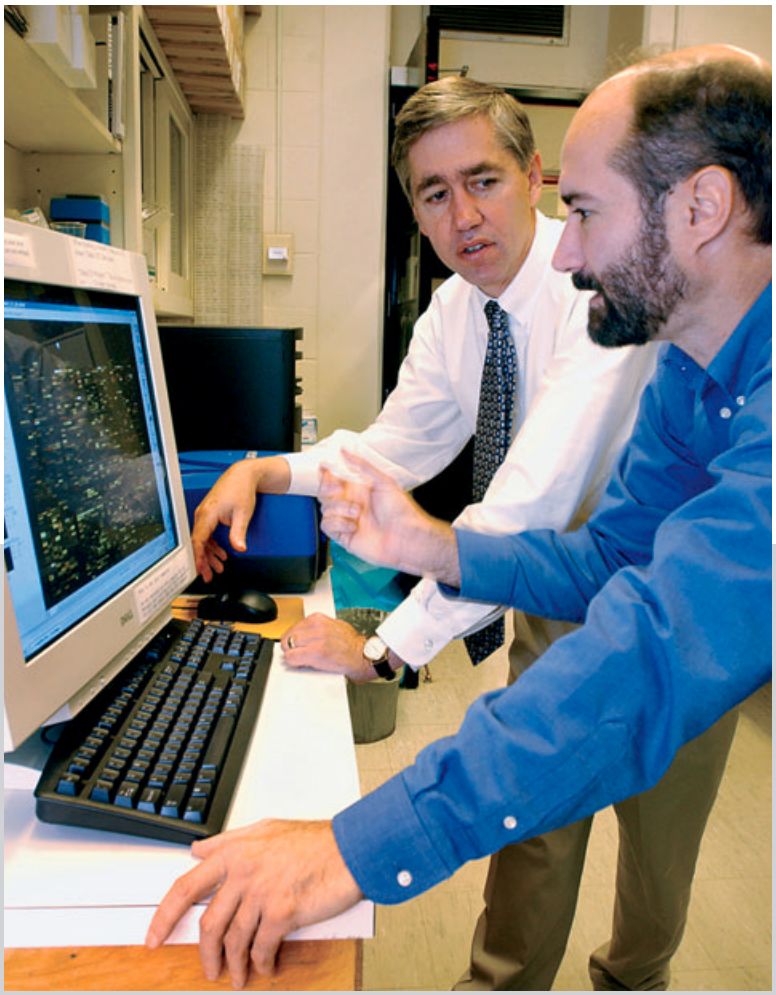
Translating Life's "Instruction Book"

In the emerging fields of genomics and proteomics, Yale is particularly well-positioned to translate the discoveries of basic science into medical practice that will extend life and alleviate human suffering. The pioneering DNA work of scientists including Frank Ruddle, Sterling Professor of Molecular, Cellular, and Developmental Biology – who popularized the term "genomics" in a 1987 paper with Johns Hopkins colleague Victor McKusick – gave rise to what is by far the largest and most ambitious research collaboration ever undertaken.

The Human Genome Project began in 1990 as an international, fifteen-year effort to determine the precise sequence of the three billion nucleotide bases that compose human DNA. By spelling out the order of these basic building blocks, the project promised to improve, by orders of magnitude, current

understanding of normal biology as well as of the mechanisms and pathways that contribute to human disease.

When the working draft of the human genetic code was completed ahead of schedule in 2000, genome project leader Francis S. Collins declared that a new era in medicine had begun. "We have caught the first glimpses of our instruction book, previously known only to God," said Collins, who received his doctorate in physical chemistry from Yale and trained at the School of Medicine as a fellow in genetics and pediatrics.



Standing at a work station at Yale's new **Center for Genomics and Proteomics** on Science Hill, **Dr. Richard Lifton** (left) and **Professor Michael Snyder** discuss differences in gene expression on human chromosome 22. The brightly colored image on the screen represents data derived from microarray technology, in which thousands of DNA or protein samples can be analyzed robotically on a single glass slide or silicon chip. The center's work, which focuses on the relationship of sequence alterations in DNA to alterations in expressed proteins, addresses the basic mechanisms of biological function and is becoming a cornerstone of personalized medicine.

This "instruction book" is rapidly being transformed into a genetic toolkit for physicians of the twenty-first century. Yale faculty members from the School of Medicine and Science Hill are collaborating on a high-profile effort to probe the data produced by the genome project for information about what the sequenced genes actually do. "The Human Genome Project gave us structure," says Michael Snyder, the Lewis B. Cullman Professor and chair of the Department of Molecular, Cellular, and Developmental Biology. "Now we're looking for function."

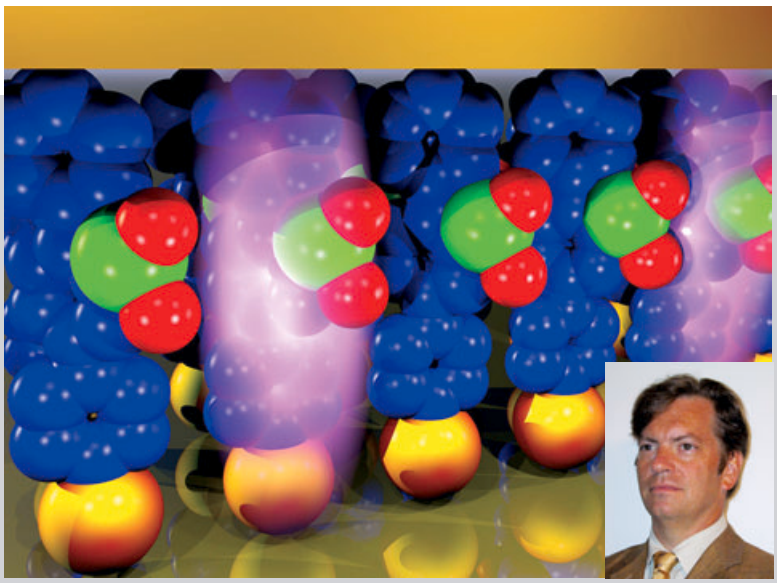
Professor Snyder heads Yale's new Center for Genomics and Proteomics, which unites more than 80 scientists in 18 departments. The Center attracted $15 million in funding in 2001 from the National Human Genome Research Institute, resources that will help pay for state-of-the-art instrumentation for large, multidisciplinary projects. It is part of an overall commitment of $200 million the University has made to advancing the fields of genomics (the study of all the genes of an organism) and proteomics (the study of all the proteins expressed by those genes). "The goal of every genomics and proteomics project ultimately is to understand how a human being develops from a single cell to a multi-trillion celled organism," says Professor Snyder. "Understanding what goes right under normal circumstances and what can go wrong will give us new avenues for treating disease."

Examples of this approach can be found in the work of Dr. Richard P. Lifton, who is Sterling Professor and chair of the Department of Genetics and a Howard Hughes Medical Institute investigator. Dr. Lifton and his collaborators across Yale and around the globe have employed an imaginative approach in the hunt for genes responsible for heart and kidney disease, stroke and osteoporosis. Dr. Lifton, whose team has identified more than twenty human disease genes, first studied rare and extreme variants of common disorders such as hypertension as a way of narrowing the search for genetic components. In the team's most recent work, they have looked at genetically isolated populations in which the incidence of a recessive disease is higher because of intermarriage.

Collaborating with physicians and patients in Iran, Dr. Lifton and Dr. Arya Mani, Associate Research Scientist in Internal Medicine, have narrowed down the genetic cause of a form of congenital heart disease to

a segment of DNA on chromosome 12. (Other studies are directed at the genetic causes of common disease in isolated communities in the Italian Alps, on the Pacific island of Kosrae and in India.) The search for the heart disease gene is focused on a stretch of DNA "only" six million nucleotide bases long, but with the tools of the genome project and Yale's core facilities, this number is not as daunting as it once would have been. Indeed, projects that scientists of a generation ago would have devoted years to, such as the mapping of a single gene, can now be accomplished in a matter of months.

To support research in the burgeoning areas of genomics and proteomics, the Keck Biotechnology Laboratory, directed by Kenneth Williams, Professor (Adjunct) of Molecular Biophysics and Biochemistry, gives Yale investigators access to advanced instrumentation for nucleic acid syntheses and sequencing, microarray analysis, mass spectrometry, and other core technologies. Professor Williams is the principal investigator for a new proteomics center at Yale funded by an $18 million contract from the National Heart, Lung and Blood Institute. Uniting 21 faculty members from 12 departments, the center will develop methods for the identification and modulation of the activities of proteins related to vascular biology, hematopoiesis, and blood pressure regulation. Such research will generate new insights into diseases such as atherosclerosis and inflammation, and will seek to clarify the basis for resistance to chemotherapy and immunological rejection of transplanted tissues and organs.



Molecular switches of the kind designed by **Professor Mark Reed** (inset) could be used to design biosensors in collaboration with Professor Ronald Breaker. Physicians might use a scanner based on such a technology to check a patient for signs of infection or exposure to toxins. Microarray-based sensors could alert authorities to acts of bioterrorism or help first responders evaluate the hazards of a chemical spill. Above: a representation of a "self-assembled monolayer" of oligomer molecules forming a molecular switch.

Life at the Nanoscale

Paul A. Fleury, the Frederick W. Beinecke Professor of Engineering and Applied Science and Dean of the Faculty of Engineering, sees a trace of irony in the sudden rise of nanotechnology—a nascent field focused on the structure and behavior of materials at the atomic level. (A nanometer is a billionth of a meter and about 80,000 times smaller than the diameter of a human hair.)

On one hand, nanotechnology is one of the most exciting areas in science today, yielding critical new information relevant to computing, electronics, optics, drug development, and the life sciences. On the other hand, nanotechnology has become a catch-all term used to dress up virtually any research project conducted at the scale of molecules. For example, Dean Fleury says, a search of the literature for papers with the keyword "nano" returns more than 3,000 articles. Remove "nano" from the article titles and the majority lose nothing of their meaning.

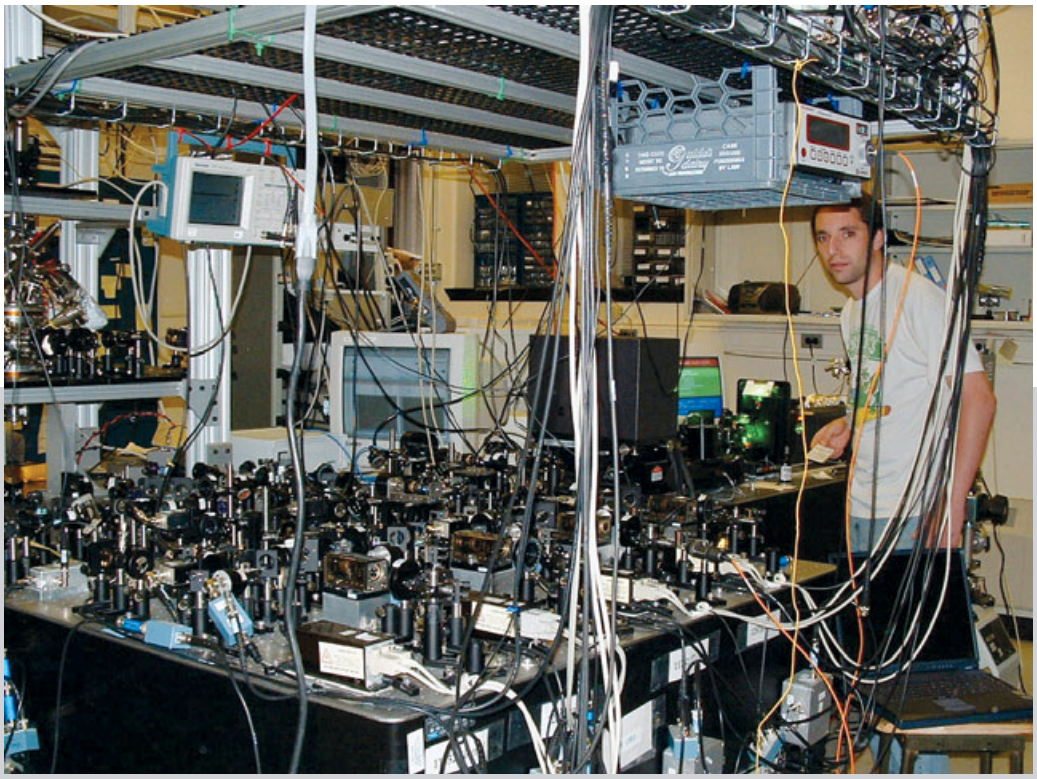
And yet nanoscience is flourishing for good reason, especially at Yale, where more than three dozen faculty members in 14 departments are collaborating to find ways to manipulate materials and control phenomena at the nanometer scale. "It's more than just a designation of scale," says Dean Fleury. "What's fascinating is that it is at this atomic level that all the scientific disciplines intersect, making interdiciplinary research attractive if not imperative."

Take, for example, the overlapping interests of Mark Reed, the Harold Hodgkinson Professor of Engineering and Applied Physics, who works at the nanoscale, and those of Ronald R. Breaker, Associate Professor of Molecular, Cellular, and Developmental Biology, who has probed the dark corners of an ancient "RNA world" that gave rise to life 3.5 billion years ago. Professor Reed's work on molecular-scale devices capable of turning current on and off enabled the development of the first molecular circuits, featured in the journal *Science* as 2001's "Breakthrough of the

Year." Professor Breaker, who has designed simple RNA and DNA switches with the potential to act as biosensors, saw much to be gained by collaborating with Reed's team a few blocks from his own laboratory in Kline Biology Tower.

"We've confirmed that biology uses these switches extensively. It's the way some genes are turned on and off," Professor Breaker says of these nucleic acid enzymes, which he believes can be engineered to detect anything from toxic chemicals to tumor cells to drug metabolites. "The dream now is to integrate them into the nanodevices that are being fabricated in labs such as Mark Reed's." For example, one of Professor Breaker's enzyme switches could be used to open a "nanopore" that allows current to flow, or to regulate the voltage carried by a "nanowire" measuring only a few nanometers in diameter. Physicians might use a scanner based on such a technology to check a patient for signs of infection or exposure to toxins. Microarray-based sensors could alert authorities to acts of bioterrorism or help first responders evaluate the hazards of a chemical spill.

Collaborations such as this have been fostered by several informal meetings of Yale's nanotech group, allowing members to stay abreast of what their colleagues in other departments are thinking and doing. It was at one of these meetings two years ago that Professors Reed and Breaker started talking. "It's wonderful to see," says Dean Fleury, "because faculty don't necessarily know what's going on . . . across the campus."



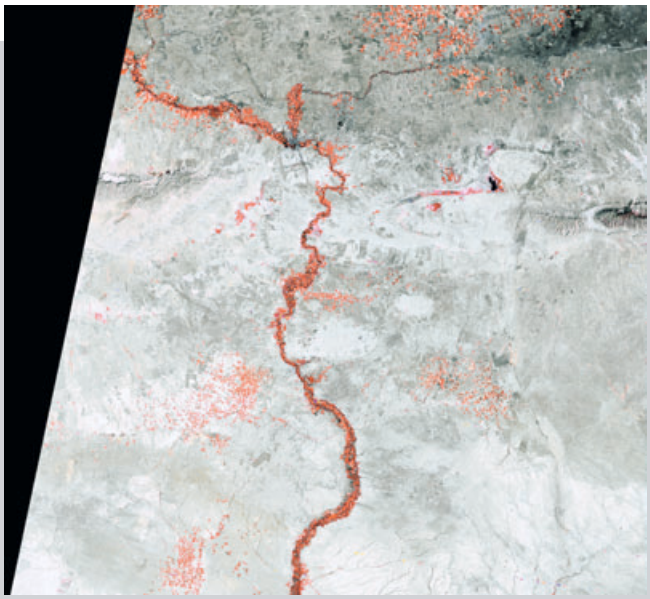
Graduate student **Jeremy Sage** is shown adjusting one of the many lasers needed for the experiment used by David DeMille's group in the **Physics Department**, to create the world's coldest polar molecules. These molecules may be used as the bits in a quantum computer. Within the department, the particle physicists are exploring phenomena in Astrophysics, the next generation of accelerators, and even higher energies described by superstrings, probing new particles at Fermilab and recreating the extreme conditions of the Early Universe right after the Big Bang. The nuclear physicists are studying and classifying exotic nuclei created in the lab and that occur in stellar objects. The condensed matter and atomic physicists are working on high temperature superconductors and nanostructures, searching for exotic new forces in nature, neutrinos and dark matter, and pursuing the holy grail of quantum computers which, when built, could solve in 20 seconds certain problems that would take the conventional computer 15 billion years (the age of the universe) to solve.

The Environmental Partnership

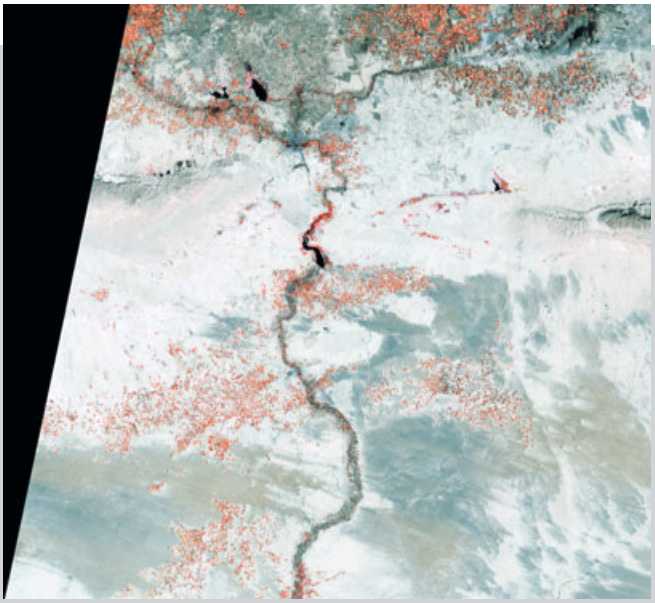
Yale's Environmental Partnership refers to an ongoing collaboration among faculty from ten of the University's schools, departments, and programs. The diversity of issues related to the environment support a rich blend of scholarly interests and expertise. For example, John Wargo, Professor of Environmental Risk Analysis Policy in Political Science and at the School of Forestry & Environmental Studies (FES), and colleagues from the Department of Epidemiology and Public Health have explored the spatial, temporal, and demographic distribution of such environmental health risks as Lyme disease and West Nile virus, providing a basis for evaluating past environmental and natural resources management policies, and suggesting legal reform. Linda Schwartz of the School of Nursing in collaboration with colleagues from FES has focused on the long-term health consequences of the chemicals used during the Vietnam War.

Since 1996, a team of researchers at Yale's Center for Earth Observation has been monitoring and interpreting an array of landscape changes occurring in the Middle East. This unique effort brings together the archeological expertise of Frank Hole, the C.J. MacCurdy Professor of Anthropology; the weather and climate knowledge of Ronald Smith, Professor of Geology and Geophysics; and the skills of an international group of students and post-doctoral associates. The group has used a wide variety of satellite images, conventional climate data, and supercomputer models of the atmospheric storms and climate to distinguish the landscape changes arising from human activities and from natural climate fluctuation.

The team found that grassland productivity responds strongly to each year's wet or dry climate anomalies while also experiencing the impact of increased grazing as Bedouin families transport their herds of sheep into the steppe. Rain-fed agriculture also is influenced by climate fluctuations, as well as national agricultural policies and global economic forces. Perhaps most dramatic of these forces has been the tripling of irrigated agriculture since 1980. Total irrigation water use in southeastern Turkey, Syria, and Iraq, largely constant for several thousand years, has quickly risen to levels comparable with available water supplies from the Tigris and Euphrates Rivers. This change has forced a shift in the location



1990



2000

Dramatic changes in irrigated agriculture are underway in the Middle East. The satellite image on the left (1990) shows intense agriculture (red shade on the image) in the narrow floodplain of the Khabur River in northeastern Syria. Ten years later (2000), the river has been dammed, diverting water to new plantations in the higher, dryer steppe. Agriculture in the lower Khabur, with a continuous history of thousands of years, has ceased. (Image analysis by **Benjamin Zaitchik and Professor Frank Hole, Yale Center for Earth Observation.**)

of agriculture. Traditional farming in some river flood plains and natural swamps has been abandoned in favor of new plantations in the dryer lands of the steppe. These dramatic changes, driven by population and climate as well as national and international economics, confront all in the region with the issue of sustainability.

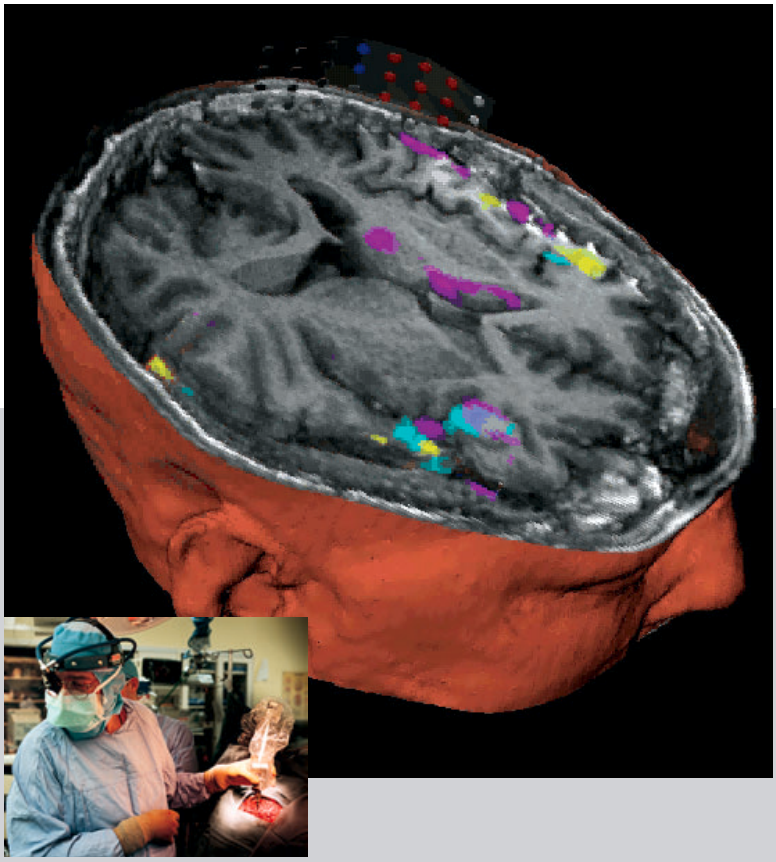
Engineering a Healthier World

In 1996, Yale created an undergraduate major in biomedical engineering, building on existing faculty expertise and developing six new courses on such topics as biomechanics, physiological systems, and image analysis. The first graduating class of eight students received their degrees in 1999, and since then, biomedical engineering has become the most popular major within the Faculty of Engineering, sending close to seventy-five students on to graduate and medical schools or jobs in industry.

The program itself had a graduation of sorts in July 2003, when it became Yale's newest department under the leadership of W. Mark Saltzman, the new chair and Goizueta Foundation Professor of Chemical and Biomedical Engineering. The expansion of biomedical engineering at Yale reflects growing interest in a field that President Levin has said "promises revolutionary opportunities to harness technology in the service of human health." Focused on three main areas—tissue engineering, drug delivery, and imaging technology—the new department has three primary faculty members from the Faculty of Engineering (with three yet to be recruited) and six from the School of Medicine. Another four faculty members from two departments and the Pierce Laboratory hold secondary appointments. The scope of their research ranges from the development of synthetic materials to ferry drugs to hard-to-reach sites in the brain to projects aimed at restoring nerve function in cases of spinal cord injury, to the creation of new magnetic resonance imaging technologies for studies of diabetes, dyslexia, and epilepsy.

Professor Saltzman says many of the faculty share an interest in the application of emerging technologies to the treatment of neurological disease. His own work as a faculty member at Johns Hopkins, Cornell, and now Yale centers on the slow release of anti-tumor drugs by means of biodegradable polymers. The department's newest recruit, Assistant Professor Erin Lavik, is doing work relevant both to paralysis and macular degeneration—two clinical areas where the regeneration of tissue would ameliorate currently irreversible conditions.

Similarly, new approaches to imaging technology promise to improve the treatment of patients with intractable epilepsy. Over the last twenty-five years, Dr. Dennis D. Spencer, the Harvey and Kate Cushing Professor of Neurosurgery and Interim Dean of the School of Medicine, has developed surgical techniques to treat cases that do not respond to anti-seizure medication. Starting in the late 1970s, Dean Spencer and colleagues began monitoring epilepsy patients—using a grid of depth electrodes placed over the exposed cortex of the brain for a week or more—to locate the malfunctioning brain tissue from which the



Using depth electrodes to record brain activity, neurosurgeons are able to locate and remove the tissue responsible for epilepsy while leaving critical brain regions unharmed. Yale scientists are now refining the procedure, hoping to use magnetic resonance (MR) imaging to reach the same outcome faster and less invasively.

Above: Electrode data are superimposed over a three-dimensional MR image of the brain. Eventually such images will be used to guide surgery. Inset: Following the current state-of-the-art procedure, **Dr. Dennis Spencer** prepares to lay down a grid of electrodes for mapping brain function.

seizures emanate. They also map critical brain regions governing motor and cognitive function that must be avoided during surgery.

Those techniques, developed with collaborators in engineering and computerized imaging, remain the state-of-the-art treatment for intractable cases of neocortical epilepsy. Now Dean Spencer and colleagues are exploring the relationship between an excitatory neurotransmitter in the brain called glutamate, which is elevated in the seizure-generating tissue, and the behavior of glial cells, which are meant to keep glutamate in check. The researchers adapted their depth electrodes—long, thin sensors that measure electrical activity—to measure glutamate by means of microdialyis, taking up minute quantities of brain fluid for analysis. "We're the only program in the world right now that is doing this," Dean Spencer says. "We'll be replacing it in the next year with biosensors that can measure glutamate, lactose, glucose, pH and oxygen—in real time, while the patient is being recorded. It will really give us a dynamic picture of the chemical changes that permit seizures to begin."

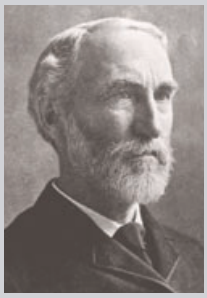
Faculty in Neurosurgery and Diagnostic Radiology, including Biomedical Engineering faculty members James S. Duncan, Lawrence Staib, Todd Constable, and Douglas Rothman, are working to improve brain imaging with this group of patients in mind. Funded by a $7.1 million grant from the newly established National Institute of Biomedical Imaging and Bioengineering, the group led by Professor Duncan is devising systems for superimposing functional magnetic resonance imaging (fMRI) data on real-time images of the surgical site during a procedure. With reflective instruments that register video with fMRI data, the surgeon will be able to see precisely where the scalpel is in relation to the diseased tissue, as well as the critical areas of brain tissue that must be avoided. Eventually, Dean Spencer hopes, this will eliminate the need for the more invasive, electrode-grid mapping process.

It may be that the intervention will become less invasive still, if Professor Saltzman's materials research can be brought to bear on the problem. "If one could devise a drug treatment that would repair the damaged tissue," says Engineering Dean Fleury, "and verify through imaging that it was in the proper region and working, traditional surgery might not be necessary." Dean Spencer adds: "The components we're envisioning include computer modeling of images to define three-dimensional brain anatomy, the use of stem cells or genetic transfer to repair dysfunctional glial cells, and bioengineering methods to enable precise delivery of the molecular therapy."

What makes this all possible, faculty members across the Yale campus say, is the University's emphasis on cross-disciplinary collaboration. "The walls between departments here aren't very high, and that's an important kind of atmosphere to have if you want a really successful biomedical engineering effort," says Professor Saltzman. "A lot of the foot-soldiers in our effort are students, and if they can't move from one laboratory to another, or one department to another, and take advantage of resources in each one, they're not going to get very far. Fortunately, Yale is a place where you can really live in both worlds. You can be an excellent physical scientist and an excellent biomedical scientist." ■

Department Chair **W. Mark Saltzman** and Assistant Professor **Erin Lavik**, of Biomedical Engineering, examine a sample of polymer wafer used for the slow release of chemotherapy agents in the brain following surgery. The newly established **Department of Biomedical Engineering** is bringing the sciences of biology and polymer chemistry together in the development of implantable biodegradable polymers for drug delivery and for scaffolding to assist repair of damaged tissue. Another group of faculty in the department is developing new imaging systems to guide the neurosurgical treatment of epilepsy.

Science at Yale: a proud tradition



Josiah Willard Gibbs, Jr.

Lars Onsager

Gregory Margulis

Sidney Altman

Joan A. Steitz

Yale University has been a major force in American science and engineering for much of its history. Benjamin Silliman (1779-1864) was a leading advocate for science at Yale and in the nation. Josiah Willard Gibbs, Jr. (1839-1903), among the most original and brilliant scientific minds America has ever known, was educated at Yale (B.A. 1858, PH.D. 1863) and a life-long member of the faculty; his groundbreaking studies of thermodynamics remain authoritative today. Edward Alexander Bouchet (1852-1918), who graduated from Yale College in 1874 and earned his doctorate in physics from Yale in 1876, was the first African-American in the United States to earn a PH.D. In 1896, Yale physicist Arthur Wright created the first X-ray image in America following Roentgen's discovery in Germany.

A number of Yale faculty and Yale-trained scientists have garnered the Nobel Prize. In Physiology/Medicine, for example, Joshua Lederberg, PH.D. 1948, and Edward L. Tatum (a former Yale faculty member) received the 1958 Nobel Prize for research on genetic recombination and the organization of the genetic material of bacteria, carried out in Yale's Osborn Memorial Laboratories. George E. Palade, founding chair of the Department of Cell Biology, was awarded the 1974 Prize for discoveries concerning the structural and functional organization of the cell. Paul Greengard won the 2000 Prize for work in signal transduction in the nervous system that he began at Yale as a professor of pharmacology in the 1970s and 1980s.

In chemistry, Lars Onsager (a professor at Yale from 1934 to 1972) was awarded the 1968 Nobel for the discovery of reciprocal relations underlying the thermodynamics of irreversible processes. The 1989 Prize was shared by Sidney Altman, currently Sterling Professor of Molecular, Cellular, and Developmental Biology, for the discovery of RNA enzymes, or "ribozymes," a finding that led to a new branch of molecular biology for treating lethal viruses and repairing genetic defects. Emeritus Chemical Engineering Professor John B. Fenn, PH.D. 1940, received the 2002 Prize for pioneering work done at Yale on the development of electrospray ionization as a means of transferring large molecules, such as proteins or polymers, into a mass spectrometer for structural characterization. The 2002 Nobel Prize in Physics was awarded to three scientists, including Yale-trained researcher Raymond Davis Jr., PH.D. '42, for pioneering contributions to astrophysics, in particular for the detection of cosmic neutrinos. The similarly prestigious Fields Medal, given once every four years, was awarded in 1978 to Gregory A. Margulis, the Erastus L. DeForest Professor of Mathematics, for his work on discrete subgroups of Lie groups.

Science Ladder and Research Faculty

School	*Ladder Faculty*	*Research Faculty*
Faculty of Arts & Sciences	242	94
School of Medicine*	808	384
Forestry & Environmental Science	23	4
School of Nursing	40	4

*Includes the Department of Epidemiology and Public Health

Our faculty includes many who have achieved the highest level of distinction. We count among them 67 members of the National Academy of Sciences, six members of the National Academy of Engineering, 32 members of the Institute of Medicine, 16 Howard Hughes Medical Institute investigators, and nine winners of the National Medal of Science or Technology—including D. Allan Bromley, Sterling Professor of the Sciences; Ronald R. Coifman, Phillips Professor of Mathematics; Joan A. Steitz, Sterling Professor of Molecular Biophysics and Biochemistry; and Jerry M. Woodall, the C. Baldwin Sawyer Professor of Electrical Engineering. In April 2003, Benoit Mandelbrot, Sterling Professor of Mathematical Sciences, was awarded the Japan Prize for his path-breaking work, which established the field of fractal geometry. Thanks to the enormous productivity of its science faculty, Yale ranks ninth among higher education recipients of funding from the National Institutes of Health. Another measure of the faculty's influence comes from Philadelphia-based Science Watch/ISI, which analyzes the impact of authors in 21 fields by tracking citations of their papers. In the most recent reports, Yale ranked fifth overall among universities, first in chemistry and engineering, second in immunology, and fifth in psychiatry/psychology. ■

The Teaching of Science at Yale

Yale College

In the first comprehensive review of the undergraduate curriculum in 30 years, the Committee on Yale College Education (CYCE), chaired by Dean Richard Brodhead and composed of 41 faculty, students, and Yale College graduates now enrolled in Yale's professional schools, reaffirmed the relevance of a liberal arts education and made recommendations in all areas for strengthening it for the twenty-first century.

In the area of science, the CYCE report underlined the importance of scientific literacy for future citizenry and urged the development of rigorous and compelling science courses especially designed for students who are not going on to advanced study in science. The committee called for other changes, including the enrichment and expansion of opportunities for research, the development of interdisciplinary courses in health and society, the strengthening of the teaching of science and technology in a social context, and a review of laboratory courses to assure their relevance and interest. To support these innovations, the committee urged the College to build a Science Teaching Center that would provide classrooms close to central campus and other facilities to encourage student exploration in technological and scientific fields through course work as well as extracurricular activities.

"Current Issues in Science" represents the first tangible result of the recommendations regarding science teaching in the CYCE report. Designed by CYCE committee members Charles Bailyn (Professor of Astronomy) and Douglas Kankel (Professor of Molecular, Cellular, and Developmental Biology), this course is a 25-student lecture/seminar, in which faculty present a series of modules, each addressing the scientific content of issues of current public interest. Among the eight topics covered are human cloning, global warming, and the search for non-terrestrial life.

One innovation in undergraduate physics instruction employs a method known as Interactive Classroom Teaching, currently utilized by Professor of Physics and Astronomy Megan Urry, Director of the Yale Center for Astronomy and Astrophysics. In a typical class the professor poses questions, which the students answer with electronic polling devices, or clickers. The students' answers are registered electronically, one per student, and at the end of the voting period, a histogram of the answers appears. If the answers are mostly correct, the professor moves on to a more difficult concept. If the answers are mostly wrong, then the professor needs to give some explanation of the underlying issue, or possibly backtrack to simpler concepts. If the answers are mixed, a short class discussion is usually sufficient to fill the gaps in understanding.

Alanna Schepartz, the Milton Harris ('29 PH.D.) Professor of Chemistry, has designed a new program for teaching chemical biology to sophomores, thanks in part to a $1 million grant awarded by the Howard Hughes Medical Institute in the fall of 2002. Her goal is to expose more students to the excitement and creativity of cutting-edge research early in their college careers. Students will explore one of the fastest-growing interdisciplinary fields, which draws on the techniques and principles of chemistry to understand and control biological processes. The laboratory component of

Blending science and common sense has fueled the success of the **Yale Program on Aging**, led by **Dr. Mary E. Tinetti,** the Gladys Phillips Crofoot Professor of Medicine and Professor of Epidemiology and Public Health, and **Dr. Sharon Inouye**, Professor of Internal Medicine and Investigative Medicine. A collaboration of more than 40 investigators in Internal Medicine, Epidemiology and Public Health and Psychiatry, the program has applied scientific rigor to explore such real-world health questions as "What puts older people at risk of falling? Of developing delirium? Of experiencing difficulty driving?" Yale studies, which were the first to probe the causes and prevention of such common geriatric health problems, have directly improved quality of life for older patients through Dr. Tinetti's fall-prevention clinic, Dr. Inouye's Hospital Elder Life Program (HELP), and other innovative efforts. "Our goal," says Dr. Tinetti, "is to help older persons be as independent as possible." Or, as Dr. Inouye puts it, "to add life to years, not necessarily years to life."

the program will include projects for summertime research. In designing the new courses, Schepartz also hopes to encourage more women to pursue careers in academic research.

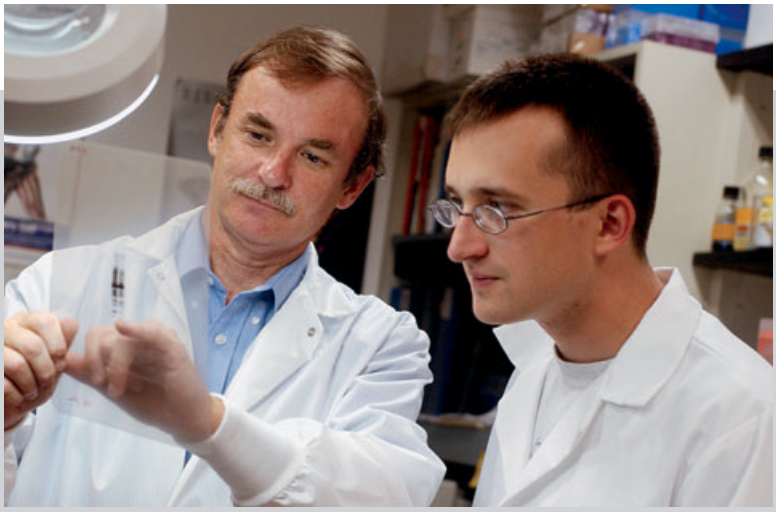
Research Opportunities

Yale has made increasing efforts to engage undergraduates in independent research projects early in their careers, through a variety of programs tailored to the individual needs of students. Students trained in these programs have published research papers and addressed national and international symposia.

Research Grants and Fellowships: Students typically receive funding for their research through a variety of programs, fellowships, and faculty research grants. Most students enter research through individual faculty-sponsored research projects, either during the academic year or in the summer. Each year, external faculty research grants contribute to the support of the research of more than 300 Yale undergraduates. In addition, more than a dozen individual fellowship programs are available for undergraduate research projects. The Yale Science and Engineering Research Presentation Travel Prize, for instance, provides support for outstanding undergraduate researchers to attend scientific and professional meetings at which they will present their research findings.

STARS Program: This Science, Technology, and Research Scholars (STARS) Program is designed to enhance the academic success of individuals from groups that have historically been under-represented in the sciences and engineering by identifying and nurturing talented students in each of the undergraduate years.

Perspectives on Science: This lecture and discussion course was designed for a limited number of freshmen who have exceptionally strong backgrounds in science, engineering



Research scientist **Walter Zawalich** with lab assistant **Greg Tesz** at the **School of Nursing**. The Zawalich team is working to understand how the beta cell regulates the secretion of insulin by exploring how the over-expression or under-expression of key proteins in the Islets of Langerhans regulates insulin secretion. It is anticipated that these studies will facilitate the design of surrogate beta cells for genetic engineering studies to replace those lost in Type 1 diabetes and establish how these proteins contribute to the changes that occur in Type 2 diabetes.

Paul Turner, Assistant Professor in the **Department of Ecology and Evolutionary Biology,** was named one of the top ten emerging scholars of color and was featured on the cover of *Black Issues in Higher Education* magazine. Turner has a strong interest in the importance of virus evolution for global epidemics, such as HIV/AIDS, and has focused his research on the exchange of genetic information between viruses that cause infectious disease. Currently, Professor Turner's laboratory uses microorganisms (RNA viruses, DNA viruses, and bacteria) as model systems to address hypotheses in ecological and evolutionary biology, especially questions regarding the evolution of genetic exchange (sex), virus ecology and evolution, host-parasite interactions, and the evolution of infectious disease.

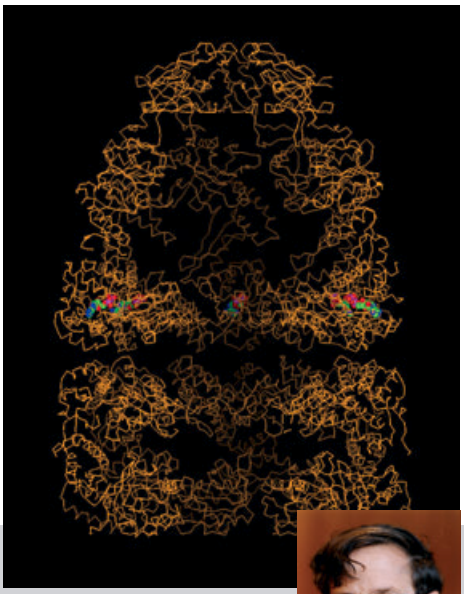
and mathematics. About 40 percent of students continue with a paid research project at Yale during the summer following the freshman year.

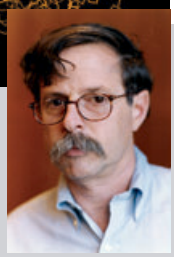
BioSTEP program: Yale Biomedical Science Training and Enrichment Program (BioSTEP) provides intensive, short-term summer research training for undergraduates in order to foster diversity and interest in careers in the biomedical sciences. Trainees conduct research projects for ten weeks in training sites and laboratories at the School of Medicine and the VA Connecticut Healthcare System in West Haven. The program is funded by the National Heart, Lung and Blood Institute.

Encouraging Diversity in Biological Sciences: The Graduate School of Arts and Sciences has launched a new research training initiative known as the Yale Post-baccalaureate Research Education Program (Yale PREP) to increase the number of students from underrepresented groups entering biomedical science graduate programs. Yale is one of eight sites in the country to receive a grant from the National Institute for General Medical Sciences for this project, which provides $1.9 million in funding over five years.

Two Yale programs are open to undergraduate students from other colleges and universities. The School of Medicine is one of eleven sites nationally for the Summer Medical Education Program, which was

Graduate student **Darcy Caulkin** is shown working at a glove box in **Professor John Hartwig's** laboratory in the **Chemistry Department**. In the Department of Chemistry, Professor John Hartwig's research program is focused on catalysis. Chemical reactions controlled by catalysis make possible a vast number of quality-of-life improvements ranging from Prozac© to perfume, sutures to Subarus and including the reduced emissions of modern cars, the abundance of fresh food at our stores, and the new pharmaceuticals that improve our health. Catalysts make chemical reactions occur faster and more selectively; in most cases the reactions they induce in minutes or hours would take entire geological periods to occur in their absence. Research in Professor Hartwig's group seeks to invent new chemical reactions that occur by the action of catalysts containing a metal atom, such as rhodium, iridium, or palladium, as the central and reactive element.





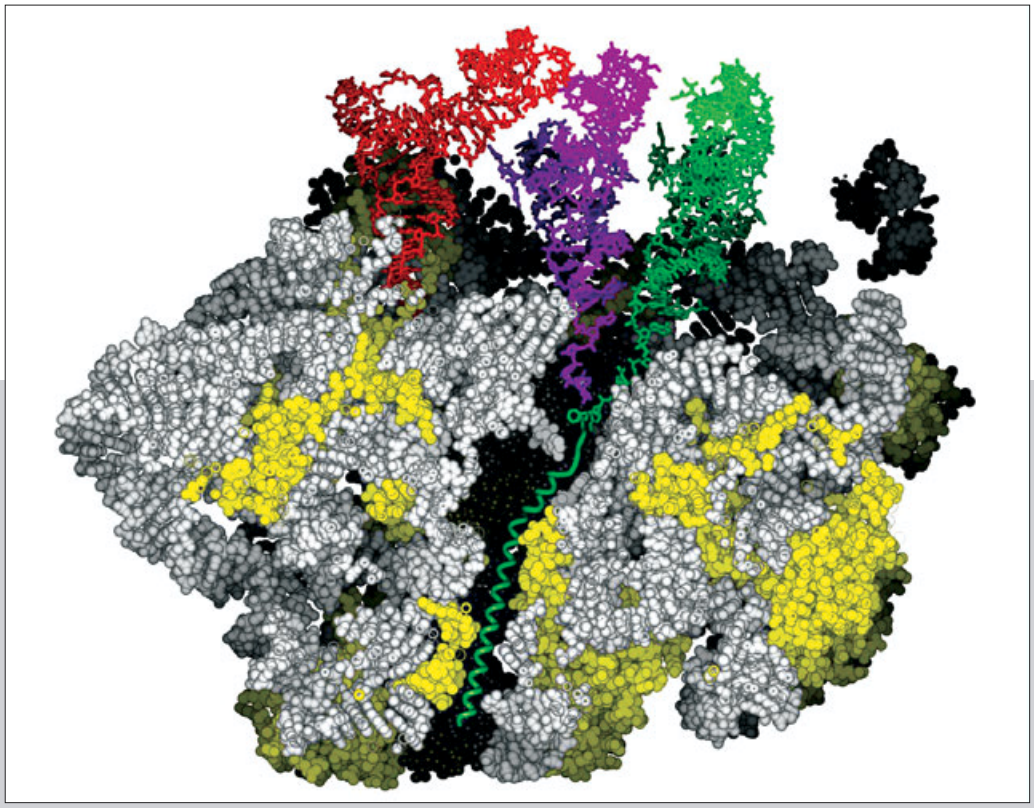
From the blueprint in its DNA, a cell manufactures the proteins needed to carry out the myriad functions of life. But for a protein to function properly, it must first fold into its characteristic, three-dimensional shape. Scientists long believed that this folding occurred spontaneously after synthesis, but work by **Dr. Arthur Horwich,** Professor of **Genetics and Pediatrics**, and colleagues revealed a large molecular machine called a "chaperonin" that is required to help the process along. (Misfolded proteins are a cause of Alzheimer's and Lou Gehrig's diseases and other disorders.) Since Horwich and colleagues published their first work on chaperonins in Nature in 1989, the field has grown enormously, yielding thousands of related papers. Dr. Horwich is one of 16 Howard Hughes Medical Institute investigators at Yale. Above: a view of a chaperonin molecule. A protein would be folded in the dome-shaped chamber at the top of the assembly.

established by the Robert Wood Johnson Foundation to promote diversity in medicine by preparing students for the medical school application process and by giving them an insider's view of academic medicine. Approximately 125 students participate in the six-week summer program. The Yale-Howard Scholars Program, initiated by the deans of the Schools of Nursing at Yale and Howard University, is an intensive summer internship designed to increase the interest of rising seniors from underrepresented populations in pursuing advanced careers in nursing. Each student identifies a research question and pursues that interest through mentored research, seminars and shadowing advanced practice nurses. The program was identified by the National Institutes of Health (NIH) as a model partnership program and has been funded nationally by the NIH.

The Graduate School

Graduate programs are an essential element of Yale's educational programs, and graduate students play a critical role in the research enterprise in science. Advanced degrees are offered in the ten professional schools as well as the Graduate School of Arts and Sciences. Approximately 550 new students enter the Graduate School each year. Students in the master's degree programs pursue advanced level studies in their chosen field. Doctoral students undertake original research or scholarship, advancing the frontiers of human knowledge.

In the four to six years of their doctoral programs, graduate students learn both the fundamental underpinnings of their subjects and the cutting-edge techniques and procedures for their study. The principal



The atomic structure of the large ribosomal subunit was determined recently in a collaborative effort between the laboratories of Professors **Thomas A. Steitz of the Molecular Biophysics and Biochemistry Department** and **Peter B. Moore** of the **Chemistry Department.** Perhaps the most important discovery in this study was that the RNA rather than the protein component of the ribosome is fundamental to the process of making proteins. Since RNA can function as a genome, like DNA, storing information in its sequences, and as an enzyme, RNA solves the "chicken and the egg" paradox of how first simple life forms could be both an enzyme and a genome, where an enzyme is necessary to copy a genome. Visualization of the structural interactions during protein synthesis provides new perspectives for the design of novel antibiotics that circumvent the acquired bacterial resistance to current antibiotics.

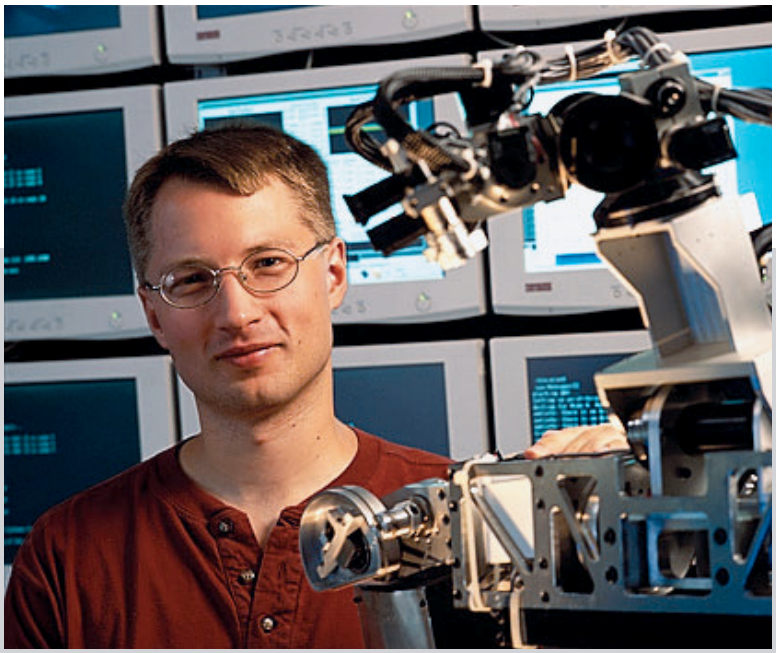
medium of education is through research in which students, under the supervision of faculty mentors, apply the scientific method of hypothesis generation and experimental or computational testing to problems at the forefront of their fields. For undergraduates, the research and learning environment is immeasurably enriched by the presence of talented and motivated graduate students.

Competition for the very best graduate students has become increasingly intense as students have become more sophisticated about emerging technologies and as the number of American students interested in pursuing graduate study, particularly in the physical sciences and engineering, has declined. Graduate programs have responded to the competitive environment by a welcome redesign of programs to meet current students' needs and by increasing financial support for graduate study.

At Yale, the faculty and departments in the biological sciences have been particularly forward-looking in redesigning graduate programs. They have aggressively augmented stipend support and redesigned the structure of graduate study in the biological and biomedical sciences to make Yale's programs more responsive to evolving trends in research and teaching. The success of the new Combined Program in the Biological and Biomedical Sciences (BBS) suggests it as a model for graduate education in other areas of science.

The creation of the BBS in 1997 from twelve free-standing graduate programs required extraordinary discussion, compromise, and trust. BBS provides a single point of entry for all students who want to pursue graduate education in the biological sciences at Yale, and includes faculty from thirty-five departments. Students enter the program in interest-based tracks and, following the first or second year of study, choose a laboratory and a departmentally based graduate program in which to pursue the Ph.D. degree. The conjoining of disparate programs makes it possible for all students to have access to all of the courses, seminars, research programs, and faculty across the Faculty of Arts and Sciences and the Medical School.

One measure of the success of the BBS program is the dramatic increase in applications, from 659 in the program's first year to 1,055 in 2003, a 60 percent increase. While more difficult to quantify, the faculty in the program report that the quality of students matriculating in the biological sciences has risen markedly. ■



In the **Computer Science Department, Assistant Professor Brian Scassellati** has established a humanoid robotics lab. It is dedicated to studying a range of issues, from low-level engineering and software systems that allow robots to move as humans do, to high-level artificial intelligence that allows robots to think like humans, and to social and psychological developments that allow robots to interact with humans in beneficial ways. The latter work involves collaborations with the Psychology Department and the Medical School on projects to evaluate models of how infants acquire social skills, and to assist in the diagnosis and quantification of disorders of social development such as autism.

Facilities for Multidisciplinary Research

The campus is showing the first results of the University's $1 billion commitment to enhance its basic science, engineering, and biomedical research facilities. Four new building projects, including two fully completed, offer unprecedented opportunities for collaboration among a range of scientific disciplines.

A New Center for Interdisciplinary Study of the Environment: Described as a "gateway to Science Hill," the Class of 1954 Environmental Science Center on Sachem Street lends new support to advancing knowledge of the environment and promoting sustainable environmental management and enlightened public policy. The facility, named to honor the Class of 1954's generous contributions to the University, is designed to encourage collaboration among faculty and students pursuing environmental studies in various programs and departments, while placing the collections of Peabody Museum of Natural History in close proximity. In addition, the Center provides laboratories, classrooms, offices, and curatorial spaces. It is the home of the Yale Institute for Biospheric Studies and accommodates faculty and students from the School of Forestry & Environmental Studies and from the Faculty of Arts and Sciences departments of Ecology and Evolutionary Biology, Geology and Geophysics, and Anthropology.

Opening of The Anlyan Center: Researchers will investigate causes and possible treatment of diseases in the newly inaugurated Anlyan Center for Medical Research and Education at the corner of Congress Avenue and Cedar Street at the School of Medicine. The approximately 700 researchers in the facility will focus on the origins and treatment of myriad diseases from arthritis and autoimmune disorders to asthma, hypertension, and cancer. The building also includes state-of-the-art anatomy and teaching labs and an unrivaled Magnetic Resonance Research Center. In the last two decades, magnetic resonance has become a crucial tool for the study of tissues and organs

Class of 1954 Evironmental Science Center A on page 17 map

Class of 1954 Chemistry Research Building B on page 17 map

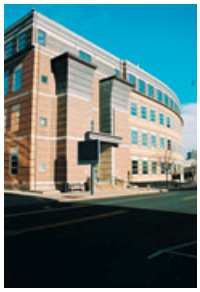
The Anlyan Center D on page 16 map

Engineering Research Building C on page 17 map

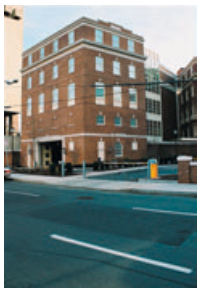
I Wing, Sterling Hall of Medicine 1

Laboratory of Epidemiology and Public Health 2

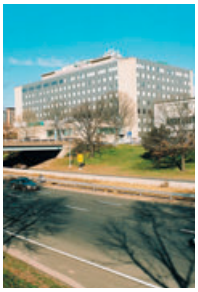
School of Nursing 3



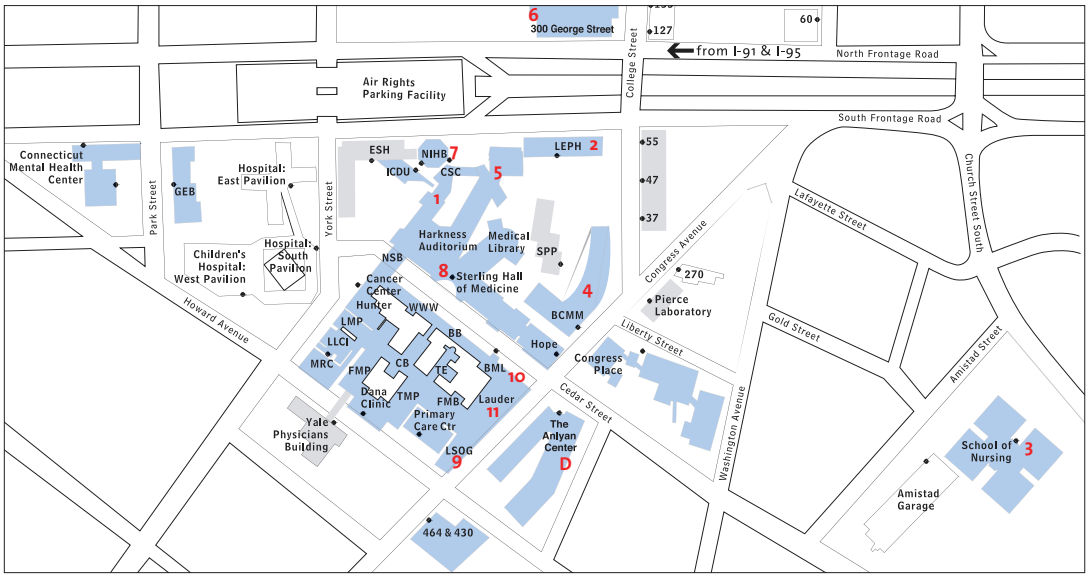
Boyer Center for Molecular Medicine 4



B Wing Extension, Sterling Hall of Medicine 5



300 George Street 6



in living organisms. The technology has allowed breakthroughs in fields ranging from neurosurgery to psychiatry, and Yale is at the forefront of this rapidly developing area.

Expansion of Chemistry Lab Facilities on Science Hill: In July 2003, construction began on the new Class of 1954 Chemistry Research Building (CRB), a state-of-the-art facility incorporating modular, flexible, and adaptable design. It will consolidate laboratories from Kline and Sterling Chemistry Laboratories. The new CRB, housing organic and inorganic research that makes intensive use of fume hoods, will be ready for occupancy in September 2005. A future renovated Sterling laboratory will continue to house theoretical chemistry research, teaching labs, classrooms, and administrative functions. It will house biological teaching labs as well. A future renovated Kline laboratory will house biophysical and physical chemistry research.

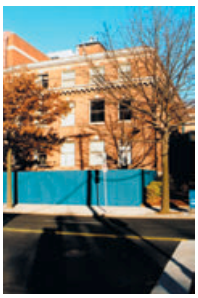
Engineering Research Building: A gift from Yale alumnus John Malone '63 will support construction of Yale's proposed new Engineering Research Building (ERB) on a triangular site on the southeast corner of Prospect and Trumbull Streets in New Haven. The proposed ERB has been programmed to flexibly accommodate new bio-engineering research labs, relocated chemical and physical engineering research labs, their support spaces, a teaching lab, seminar rooms, faculty and staff offices, and open offices for graduate student workstations. ■

Neison and Irving Harris Building 7

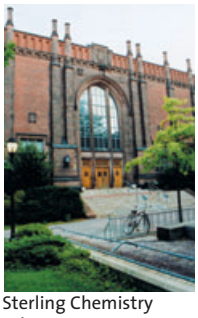
Sterling Hall of Medicine 8

Laboratory for Surgery, Obstetrics, and Gynecology 9

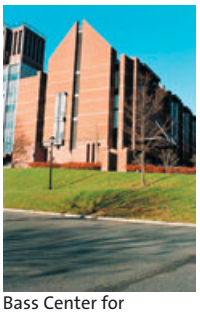
Brady Memorial Laboratory 10



Lauder Hall 11



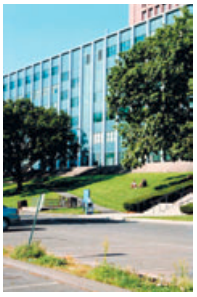
Sterling Chemistry Laboratory 12



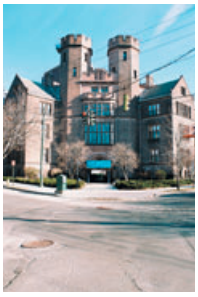
Bass Center for Molecular and Structural Biology 13

Kline Biology Tower 14

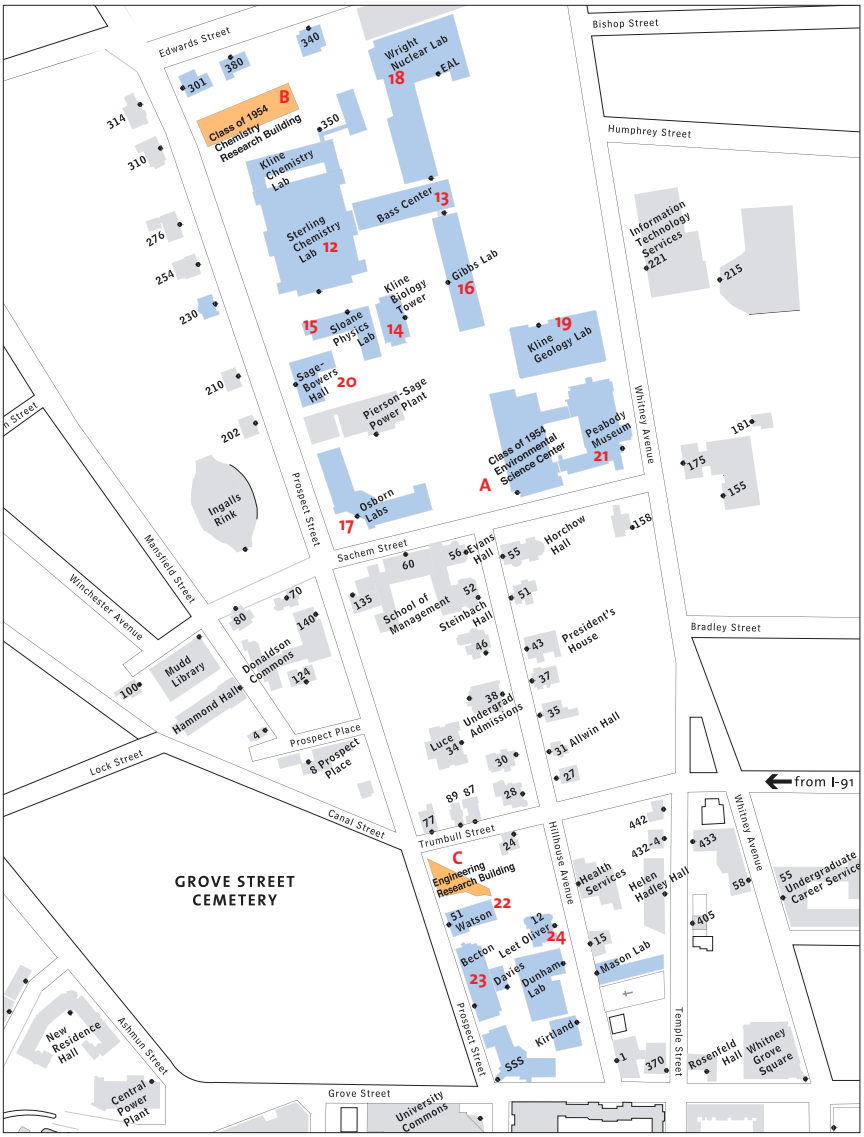
Sloane Physics Laboratory 15



Gibbs Laboratories 16



Osborn Memorial Laboratories 17



Arthur W. Wright Nuclear Structure Laboratory 18

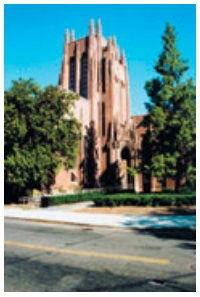
Yale science research buildings

Yale science research buildings in design or under construction

Other Yale buildings

Kline Geology Laboratory 19

Sage-Bowers Hall 20



Peabody Museum of Natural History 21

Arthur K. Watson Hall 22

Becton Engineering and Applied Science Center 23

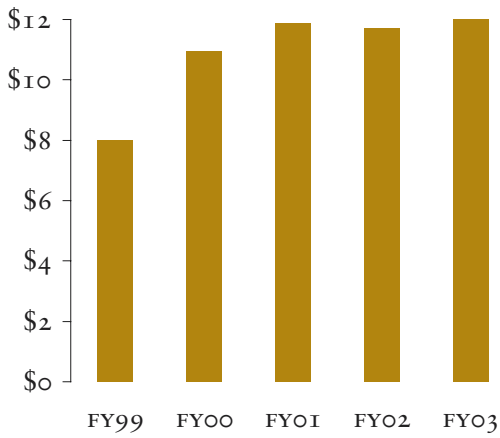
Leet Oliver Memorial Hall 24

Financial Results Overview

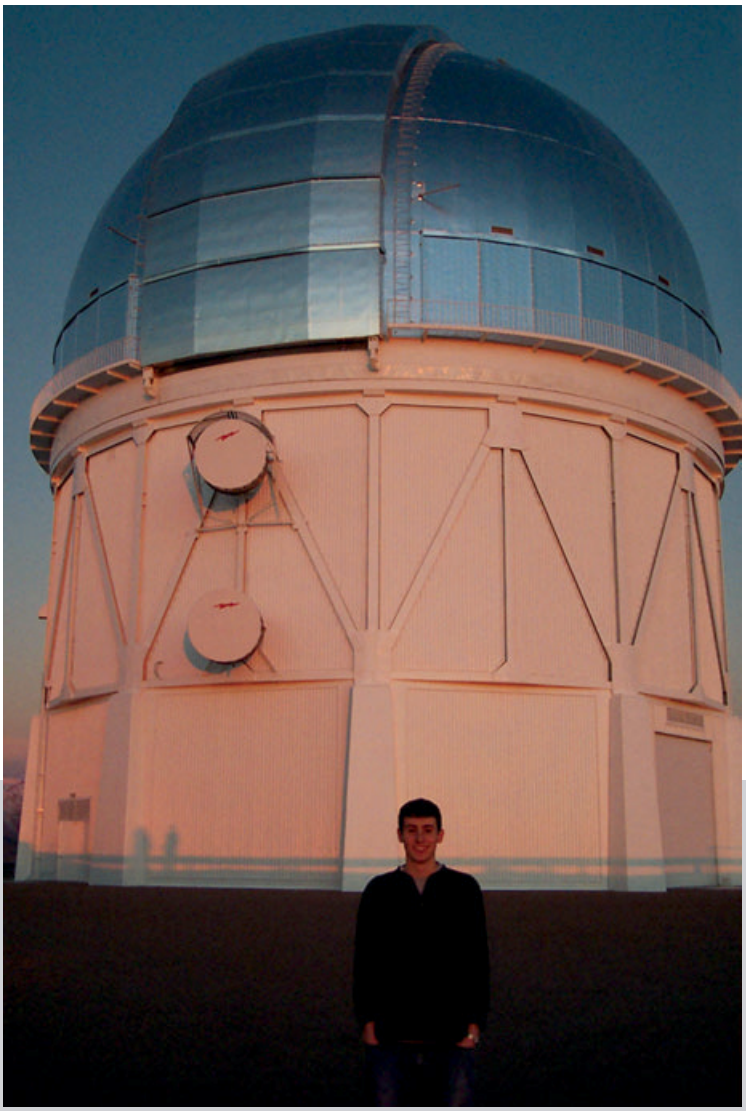
At June 30, 2003, Yale reported total assets of $14.2 billion, liabilities of $2.0 billion, and net assets of $12.2 billion. Net assets increased by $493.4 million during the year, primarily because of the outstanding 8.8% return on the endowment.

Net Assets

Five-year trend analysis ($ in billions)



The University, once again, achieved a balanced general operating budget, as presented in the Supplemental Statement of Operations. Total operating revenue increased by 5.5% to $1.55 billion. Increases in the allocation of endowment spending to operations and revenues from grants and contracts were the largest contributors to this growth. Total operating expenses increased by 8.1% to $1.54 billion. Net assets from operating activities increased $10.6 million during the year.



Perspectives on Science student **David Moore** standing outside the Cerro-Tololo 4-meter telescope dome in Chile during his summer research internship at the **Yale Center for Astronomy and Astrophysics**. Faculty of the **Astronomy Department** are investigating the origin, evolution, and structure of the universe. Its dominant constituents, dark matter and dark energy, are being studied currently with the novel QUEST cameras on telescopes in Venezuela and California. Astronomers are studying the formation and evolution of stars and galaxies, including our own Milky Way, and of black holes and other ultra-relativistic phenomena. Much of this work is enabled by a formal collaboration with Chile, where the finest astronomical sites on the planet are found, through joint scientific projects and the SMARTS network of small telescopes controlled from New Haven. The combination of data from ground-based sites in Chile with data from space missions is particularly fruitful.

Operating Revenue

As shown in the chart below, the University derives its operating revenues from five main sources: student income, grants and contracts, medical services, contributions, and investments. Additional revenues are received from a variety of programs. Operating revenues from all sources totaled $1.55 billion in 2003.

Student Income

Student income, which includes revenue from tuition, fees, and room and board, increased 0.6% during 2003 and amounted to $210 million, or 13.5% of operating revenues. Of the total amount, tuition and fees accounted for $273.0 million, a 5.7% increase over 2002. Revenue from room and board increased 5.9% to $44.8 million during 2003. During the 2002-03 academic year, 11,160 students were enrolled at the University; 5,307 were undergraduate students attending programs at Yale College, and 5,853 were pursuing their studies at the Graduate School of Arts and Sciences and ten professional schools. (Figures are based on full-time equivalents.)

Students enrolled in Yale College paid $27,130 for tuition and $8,240 for room and board, bringing the total term bill to $35,370 for the 2002-03 academic year. The increase in the Yale College term bill was limited to 3.9% over the 2001-02 academic year, a reflection of the high priority placed on making a Yale College education accessible to the broadest range of students. Students enrolled in the Graduate School of Arts and Sciences paid $24,480 for tuition, a 3.5% increase over the 2001-02 academic year.

In accordance with generally accepted accounting principles, student income is presented net of certain scholarships and fellowships, which totaled $107.4 million and $91.6 million for 2003 and 2002, respectively. The 17.2% increase over 2002 is due to new financial aid initiatives which reduced the self-help level expected of students to cover their education costs through work or student loans. This reduction in self-help generated an increased need in scholarships and fellowships.

As it has since 1964, the University maintained its policy of offering Yale College admission to qualified U.S. and Canadian citizens and permanent residents without regard to family financial circumstances. This "need-blind" admission policy is supported with a commitment to meet in full the demonstrated financial need of all such students throughout their four undergraduate years. The 2002-03 academic year marked the second year in a four-year phased plan to extend the need-blind/full-need based policy to foreign students. Despite the erosion in federal support for student aid, the University is able to maintain its policies and its competitive position by attracting the very best students.

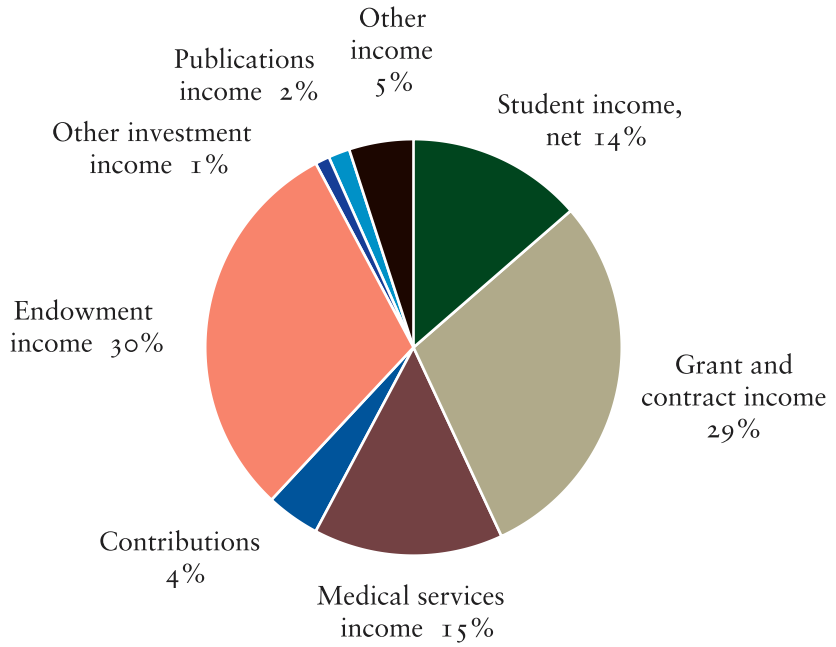
During the 2002-03 academic year, 2,111 Yale College students, representing 40% of eligible Yale College enrollment, received financial aid. In the Graduate School of Arts and Sciences, 2,201 students, or 97.6% of those eligible, received financial aid. In the professional schools, 2,796 students, or 81.5% of those eligible, received financial aid. In all, 7,108 University students, or 64.8% of total University eligible enrollment, received University-administered student aid in the form of loans, gifts, or a combination of both.

Grant and Contract Income

Grant and contract income experienced a 9.6% growth from $417.6 million in 2002 to $457.8 million in 2003. The Yale School of Medicine, which receives 77% of the University's grant and contract income, reported an increase of 9.3% for 2003, while the remaining University sectors had an increase of 10.8%.

$366 million, or 80% of 2003 grant and contract income, was received from the federal government in support of Yale's research and

Operating Revenue



training programs. The largest federal sponsor is the National Institutes of Health, which provided revenues of $281 million during 2003, an increase of 9.2% over the prior year. The University also receives significant research support from the National Science Foundation, the Department of Energy, the Department of Defense, and student aid awards from the Department of Education. Non-federal sources, which include foundations, voluntary health agencies, corporations, and the State of Connecticut, provide an additional $92 million in research, training, and other purposes.

In addition to funding the direct cost of sponsored programs, grant and contract awards generally include reimbursement for a portion of the costs related to research laboratories and other facilities, as well as administrative and support costs incurred for research and other sponsored activities. These reimbursements for facility and administrative costs amounted to $104.9 million in 2003, which is an increase of 9.6% over the prior year. Recovery of facility and administrative costs allocable to federally sponsored programs is recorded at rates negotiated with the University's cognizant agency, the Department of Health and Human Services. Yale's current rate agreement is effective from July 1, 2002 through June 30, 2005.

The primary regulations governing federal grants and contracts are encompassed in Office of Management and Budget Circular A-21, *Cost Principles for Educational Institutions,* and Circular A-110, *Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations*. The A-21 principles were modified during the 1990's to impose limits on the types and amounts of indirect costs eligible for reimbursement and to mandate more stringent Federal Cost Accounting Standards for both grants and contracts.

Medical Services Income

Medical services income totaled $229.6 million in fiscal 2003 and is a significant component of the University's operating revenue while providing support for the University's mission to preserve and disseminate knowledge through research and teaching.

The largest portion of this revenue stream is derived from patient care services provided by the School of Medicine's Yale Medical Group. Other components include income from diagnostic laboratory services and contracts with affiliated hospitals, including Yale-New Haven Hospital, Inc. (YNHH). The 7.5% increase in patient care income during the year is a result of increased volume of services provided to YNHH and new contracts in the areas of Psychiatry and Internal Medicine. In addition, the Yale Medical Group continues to be successful in negotiating with third party managed care payers to improve reimbursement schedules and increase efficiencies in patient billing practices.

While academic medical centers continue to experience the economic pressures of decreased reimbursement rates and increasing cost of services to provide quality health care, the University has been able, through innovative and efficient management, to keep its clinical operations at break-even during this difficult period. The University must identify efficiencies and implement streamlined techniques to continue to provide health care to the community and to perform the clinical research that will help current and future generations maintain and improve health.

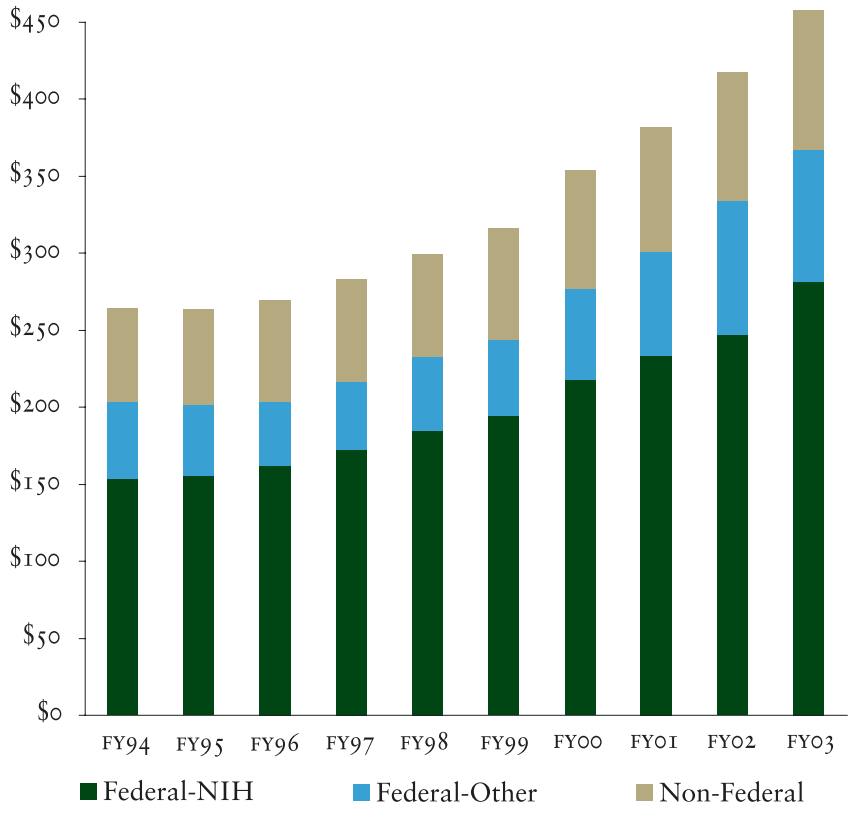
The cost of malpractice insurance is becoming an increasing burden in the health care market. Costs of the settlement of claims are increasing to unprecedented levels. While prevention techniques, including targeted risk management awareness programs and patient safety initiatives are being implemented and refined, the benefits of these techniques cannot completely control the external factors which lead to these increasing costs to health care providers.

Allocation of Endowment Spending from Financial Capital

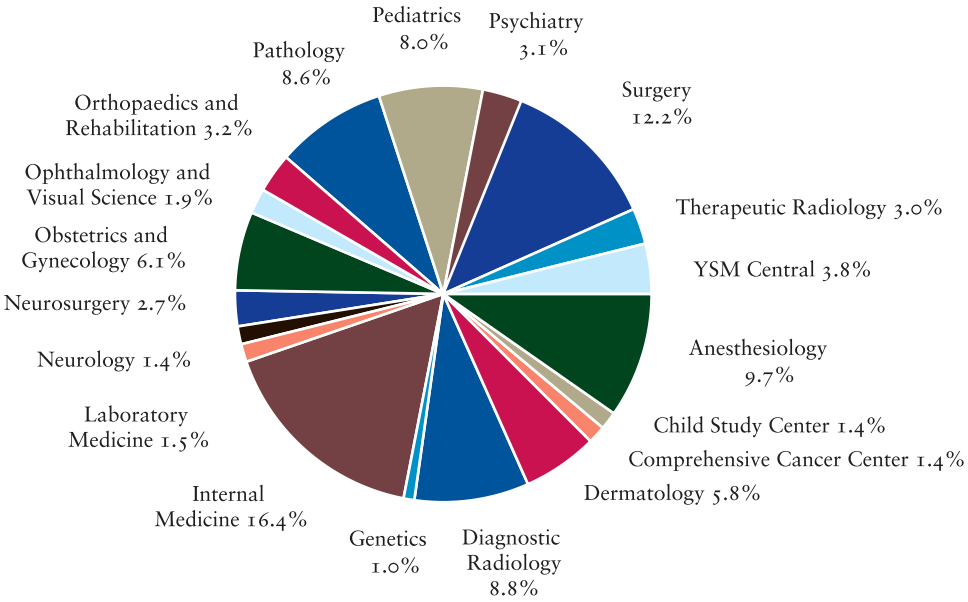
Each year, a portion of accumulated endowment investment returns is allocated to operating net assets to support operational activity. The level of spending is computed in accordance with the endowment spending policy based on a spending formula that has the effect of smoothing year-to-year market swings. Endowment investment returns allocated to operating activities increased by 13.3% to $470.1 million. This important source of revenue represents 30.3% of total operating income this year and has become the largest source of operating revenue for the University. The performance of the endow-

Grant and Contract Income

Ten-year trend analysis ($ in millions)



School of Medicine Clinical Income by Department



ment investment portfolio and the endowment spending policy are discussed in detail in the endowment section of this report.

Other Investment Income

Other investment income of $17.4 million represents interest, dividends, and gains on investments held outside of the endowment.

Contributions

Contributions revenue from Operating, Physical, and Financial activities totaled $174.1 million for 2003. This represents a 22% decrease from 2002's revenue of $223.5 million. Lower contributions were not unexpected since prior year activities included several large, one-time gifts.

Publications and Other Income

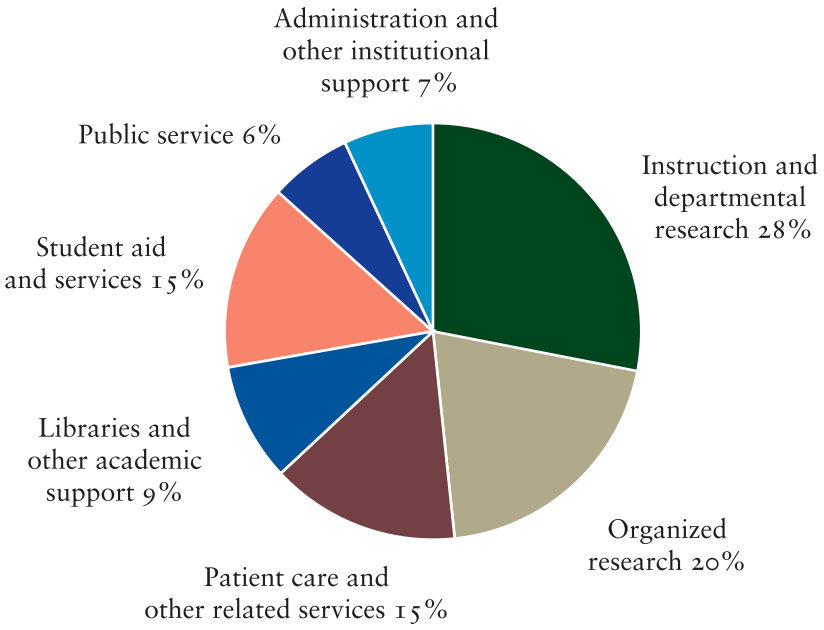
Publications income is earned primarily through Yale University Press, a separately endowed unit within the University. The Press published approximately 300 titles in 2003 and has approximately 3,500 titles in print. Many of these books are winners of prizes, including four Pulitzer Prizes. Yale Press authors are academic and professional people from all over the world. One of the 2003 publications was *Benjamin Franklin*, a New York Times best seller by Edmund Morgan, Sterling Professor Emeritus of History at Yale University. In 2002, Yale Press published another New York Times best seller, *Taliban*, by Ahmed Rashid. Income from the Press was $24.0 million in 2003, which was an increase of 6.2% from revenue of $22.6 million in 2002.

Operating Expenses

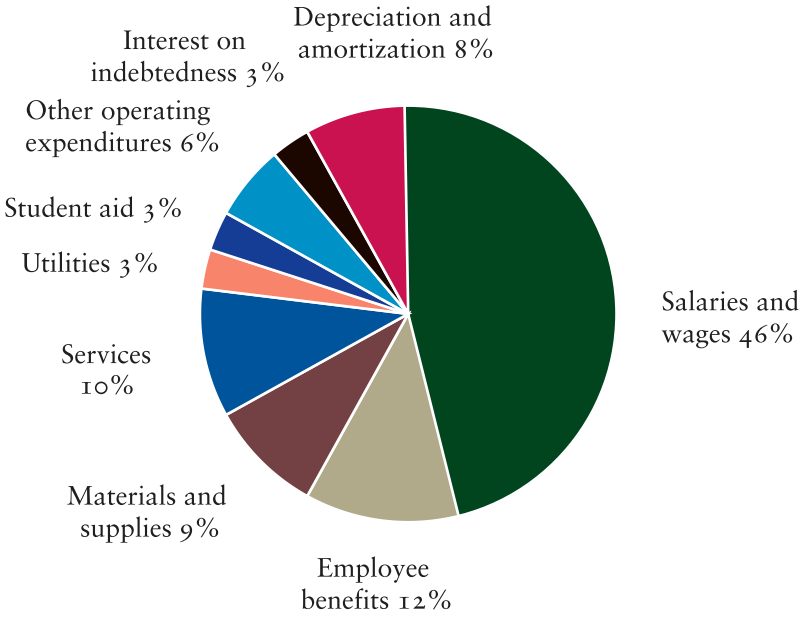
Operating expenses totaled $1.5 billion for the year. The largest component of expenses, salaries and wages and employee benefits, rose 7.8%. This category of expense represents 58.3% of total University operating costs. Other items of interest were a 27% increase in utilities and an 11.4% increase in depreciation. Higher fuel prices and the harsh winter were responsible for the increase in utilities. The completion of several major capital projects caused the increase in depreciation.

In accordance with generally accepted accounting principles, Yale reports its operating expenses by functional classification on the Statement of Activities. The largest functional expenses, organized research, and instruction and department research, increased by 10%. Together, these costs represent 48% of total operating expenses. The increase was the result of higher federal funding for research and the University's commitment to investing in faculty and new programs in education.

Operating Expenses by Functional Classification



Operating Expenses by Natural Classification



Faculty and Staff Compensation

The University employs approximately 3,200 faculty, 3,500 managerial and professional staff, and 4,000 unionized clerical, technical, service, and maintenance personnel, based on full-time equivalents. Total salaries and wages and related employee benefits were $899.7 million in 2003, which is a 7.8% increase from 2002. These increases were in line with the University's overall plans to maintain moderate growth and competitive position with peer institutions. Faculty salaries, which comprise 45.4% of total compensation, rose 7.6% in 2003. Since competition for the most qualified candidates is keen among academic institutions and private sector organizations, compensation packages must be competitive in order to recruit and retain faculty of the highest caliber. The University has also made it a priority to ensure that the salary and benefit programs for staff are equitable and competitive with the marketplace.

The cost of providing employee benefits, including various pension, postretirement health, and insurance plans in addition to social security and other statutory benefits, amounted to $181.4 million, an increase of 10.4% from 2002.

Other Expenses

Expenses other than compensation reported by natural classification on the Supplemental Statement of Operations include materials and supplies, services, utilities, student aid, interest on indebtedness, depreciation expense, and other operating expenses. These items accounted for $643.4 million in 2003, up 8.6% from 2002.

Physical Capital

The University continued its extensive capital improvements campaign aimed at renovating existing facilities and selectively adding new facilities. Spending on capital projects totaled $207.6 million during 2003.

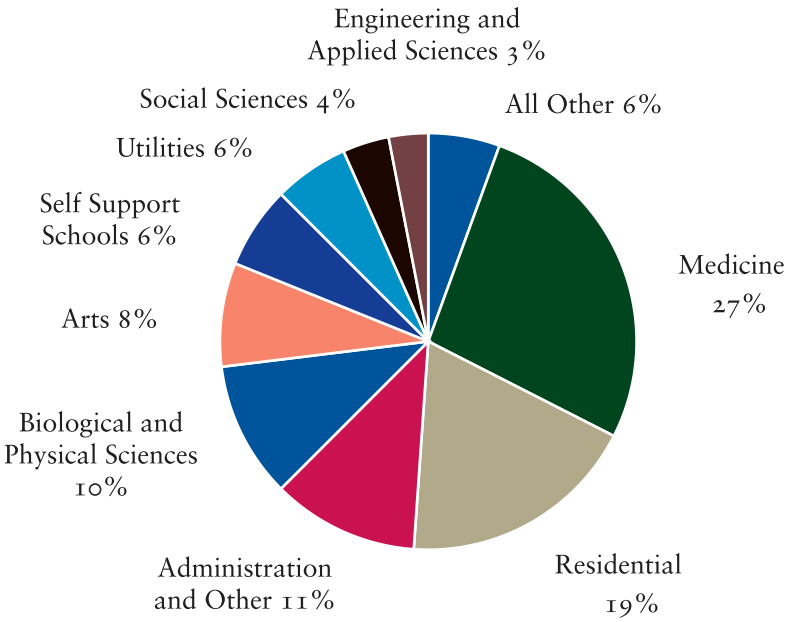
As in previous years, capital spending was concentrated on the School of Medicine and the residential colleges. The School of Medicine accounted for more than a quarter of the University's 2003 capital expenditures primarily because $27.6 million was spent to complete the Anlyan Center (formerly called the Congress Avenue Building) which, at 457,000 gross square feet, is the University's third largest building behind the Payne Whitney Gymnasium and Sterling Memorial Library. The Medical School's Amistad Garage was also completed in 2003. This is the first phase of a project that will ultimately provide clinical office space in addition to the new parking structure.

Spending for the residential colleges also consumed a large proportion of total capital resources, demonstrating the University's continuing commitment to fully refurbish its undergraduate residential facilities. In 2003 Timothy Dwight was completed, joining Berkeley, Branford, and Saybrook as having been fully or nearly fully renovated. Significant spending ($14 million) was directed to the renovation of Vanderbilt Hall, a freshman residence hall (which was completed in time for the start of the 2003-04 academic year). The renovations of Davenport and Pierson Colleges were in the design phase in 2003, while the renovations of Silliman and Trumbull entered the planning phases. Morse and Stiles, the two most recently built colleges, and Calhoun have had more recent attention and, therefore, will require a smaller investment when they are renovated. That leaves Jonathan Edwards as the last college requiring a comprehensive renovation. Attention will turn to restoring Jonathan Edwards following the renovations of Silliman and Trumbull.

Science facilities continue to be a focus of renovation and new construction. In 2003, rehabilitation work was underway or completed for several existing buildings, including Kline Biology Tower, Osborn Memorial Lab, and the Peabody Museum. At the same time, plans for three new buildings progressed. The Molecular, Cellular and Developmental Biology building moved into the planning phase, while the Chemistry Research Building and Engineering Research Building progressed to the design phase. These state-of-the-art buildings are key components in Yale's strategy to enhance its competitiveness in the sciences.

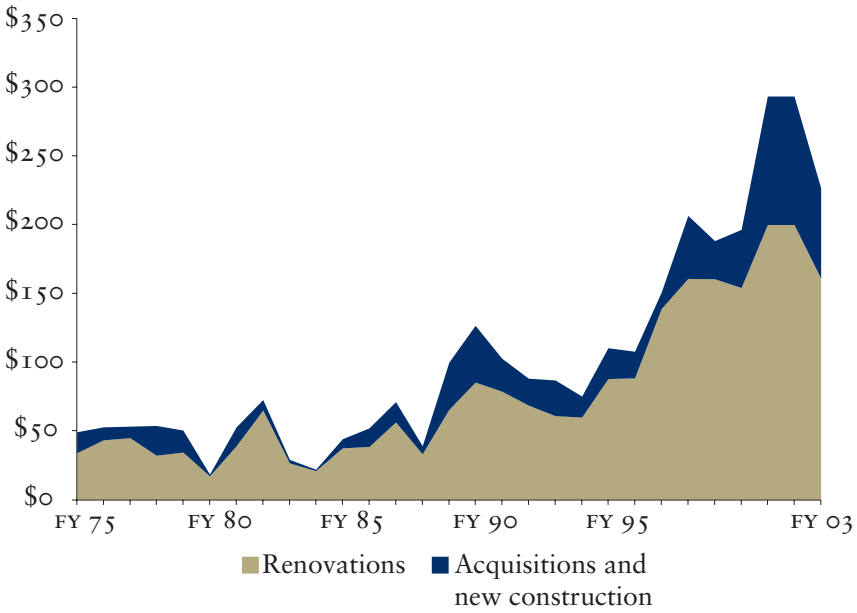
Yale continued to address needs in other areas of the University, consistent with its strategy of modernizing all areas of the campus. The Sterling Divinity Quadrangle was fully renovated in 2003. The Arts area

Capital Spending by Campus Area



Capital Disbursements

($ in millions; in 2003 dollars)



received attention as well, with a focus on a number of construction projects involving the Yale University Art Gallery; the School of Architecture, the Arts Library, and the Department of Art History. Finally, the University spent $13.2 million during 2003 for utilities expansion and improvements in order to support existing and new buildings.

The University continues to rely heavily on the extraordinary generosity of its alumni/ae and friends. Gifts for facilities in 2003 totaled $17.2 million. The University has set gift targets for many of its projects and has been the beneficiary of an outstanding response from donors. Portions of the residential college renovations, Sprague Hall, and indeed, nearly all of the University's recent major renovation undertakings have been funded through gifts.

The other major source of financing for University projects is debt. The University issued $350 million in tax-exempt debt in January 2003 through the Connecticut Health and Educational Facilities Authority. Total outstanding facility debt for the University is now $1.54 billion. The University continues to benefit from advantageous interest rate conditions through its substantial variable-rate debt program, but has hedged a significant portion of its interest rate exposure with taxable interest rate swaps. As of June 30, 2003, Yale had $480 million in swaps outstanding associated with debt-financing building projects. Through the combination of direct issuance and swaps, the portfolio is now approximately 67% fixed and 33% variable.

Although the University relies on the liquidity of its own portfolio to fund any return of variable-rate bonds, it has entered into a revolving credit arrangement totaling $200 million to serve as a backup liquidity facility. With the exception of its taxable commercial paper, which can be retired at will, and certain small borrowings, all of the University's debt is in the form of bullet maturities due between 2027 and 2096; that is, the debt matures in a single or a few years at the end of its life.

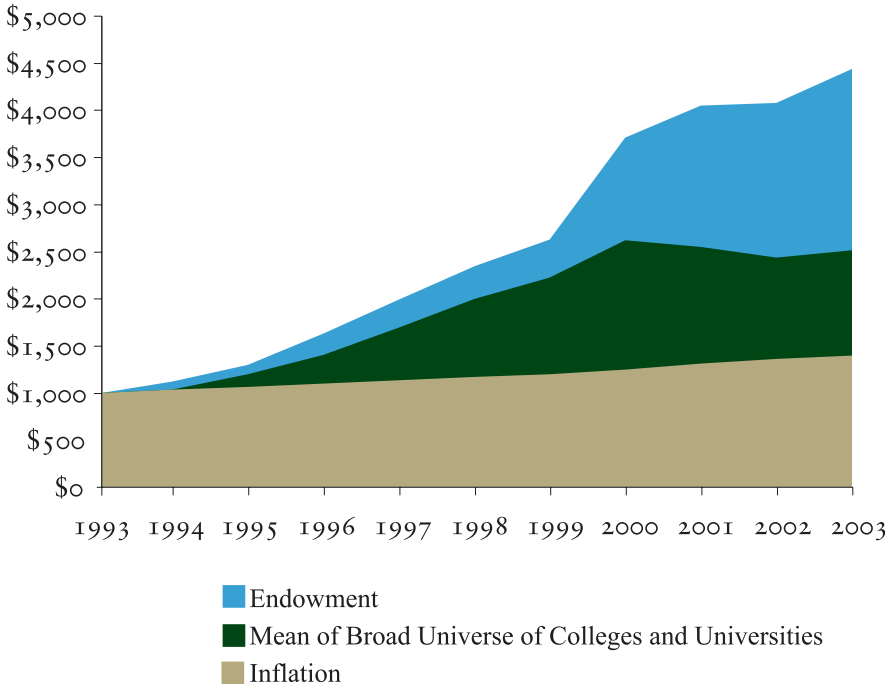
The University continues to enjoy the highest bond ratings available: AAA from Standard and Poor's and Aaa from Moody's.

Geology graduate student Alana Kawakami stands within a box canyon in the Black Mountains, California. The course sediments in this photograph are part of an apron of debris that was shed by this still-rising mountain range on the margin of Death Valley. Over the last five years the **Department of Geology and Geophysics** has rejuvenated the traditional strengths of the department in geochemistry, the study of mountain building, paleontology, geophysics, and the earth's oceans and atmosphere. The department has hired ten new geologists. Each of these scientists is an expert in a critical area such as earthquakes, the dynamics of the earth, processes and materials deep below the earth's surface, the flow of ice and of the atmosphere, past and present climate, the evolution of early life-forms, the biology of microscopic organisms living in extreme environments, paleomagnetism, or the history of change in the atmosphere. Yet each also has the ability to collaborate on a broader range of research initiatives. Faculty renewal has led to a significant increase of postdoctoral researchers and graduate students and has been coupled with an ongoing renewal of G&G computer and laboratory facilities as well. A new isotope laboratory with four mass spectrometers in the recently built Environmental Science Center integrates them into the teaching and research missions of the department.

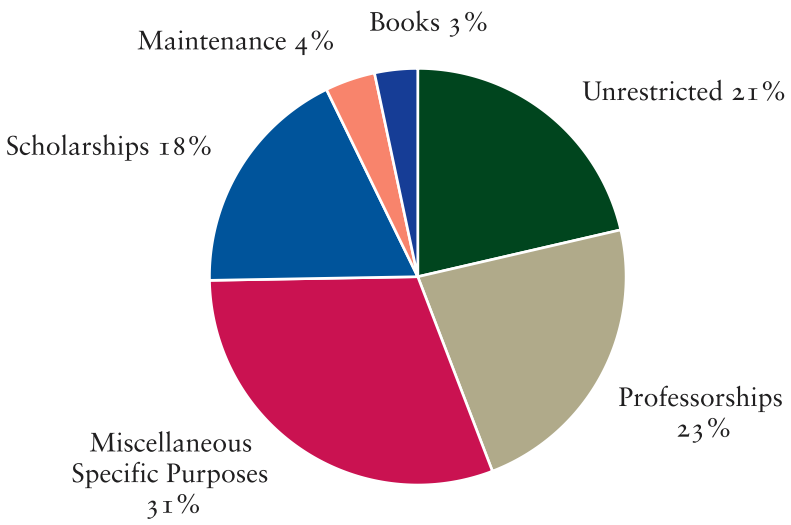
Endowment

The Endowment supports both current and future academic programs of the University. To balance these current and future needs, Yale adopted investment and spending policies designed to preserve Endowment asset values while providing a substantial flow of income to the operating budget. At June 30, 2003, the Endowment, including assets held in trust and beneficial interest in trust assets, stood at more than $11.0 billion, after providing $470 million to the operating budget during the year.

Growth of $1,000
1993-2003



Endowment Fund Allocation
Fiscal Year 2003



Investment Performance
For the year ended June 30, 2003, the Endowment achieved an 8.8% investment return. During the past decade, the Endowment earned an annualized 16.0% return, placing the University at the top of the universe of institutional funds. Yale's disciplined and diversified asset allocation policies combined with strong active management added substantial value to the Endowment.

Over the ten years ended June 30, 2003, Yale's superior investment returns added $4.7 billion relative its composite passive benchmark and $5.2 billion relative to the mean return of a broad universe of colleges and universities.

Endowment Spending
The Endowment spending policy, the means by which Endowment earnings are allocated to operations, balances the competing objectives of providing a stable flow of income to the operating budget and protecting the real value of the Endowment over time. The spending policy attempts to achieve these two objectives by using a long-term spending rate target combined with a smoothing rule, which adjusts spending gradually in response to changes in Endowment market value. The spending rate approved by the Yale Corporation currently stands at 5.0%. The smoothing rule and the diversified nature of the Endowment mitigate the impact of short-term market volatility.

The Endowment provided $470 million to current operations in 2003, representing 30.3% of the University's operating revenues for the year. Ten years ago, Endowment distributions contributed approximately $119 million, or 14% of the budget. Over the past decade, Endowment distributions increased at an annualized rate of nearly 15%.

Asset Allocation
Asset allocation proves critical to successful Endowment performance. Yale's asset allocation policy combines tested theory and informed market judgment to balance investment risks with the need for high returns.

The need to provide resources for current operations as well as preserve the purchasing power of assets dictates investing for high returns, causing the Endowment to be biased toward equity. In addition, the Endowment's vulnerability to inflation directs the University away from fixed income and toward equity instruments. Hence, over 90% of the Endowment is invested in some form of equity, through domestic and international securities, real estate, and private equity.

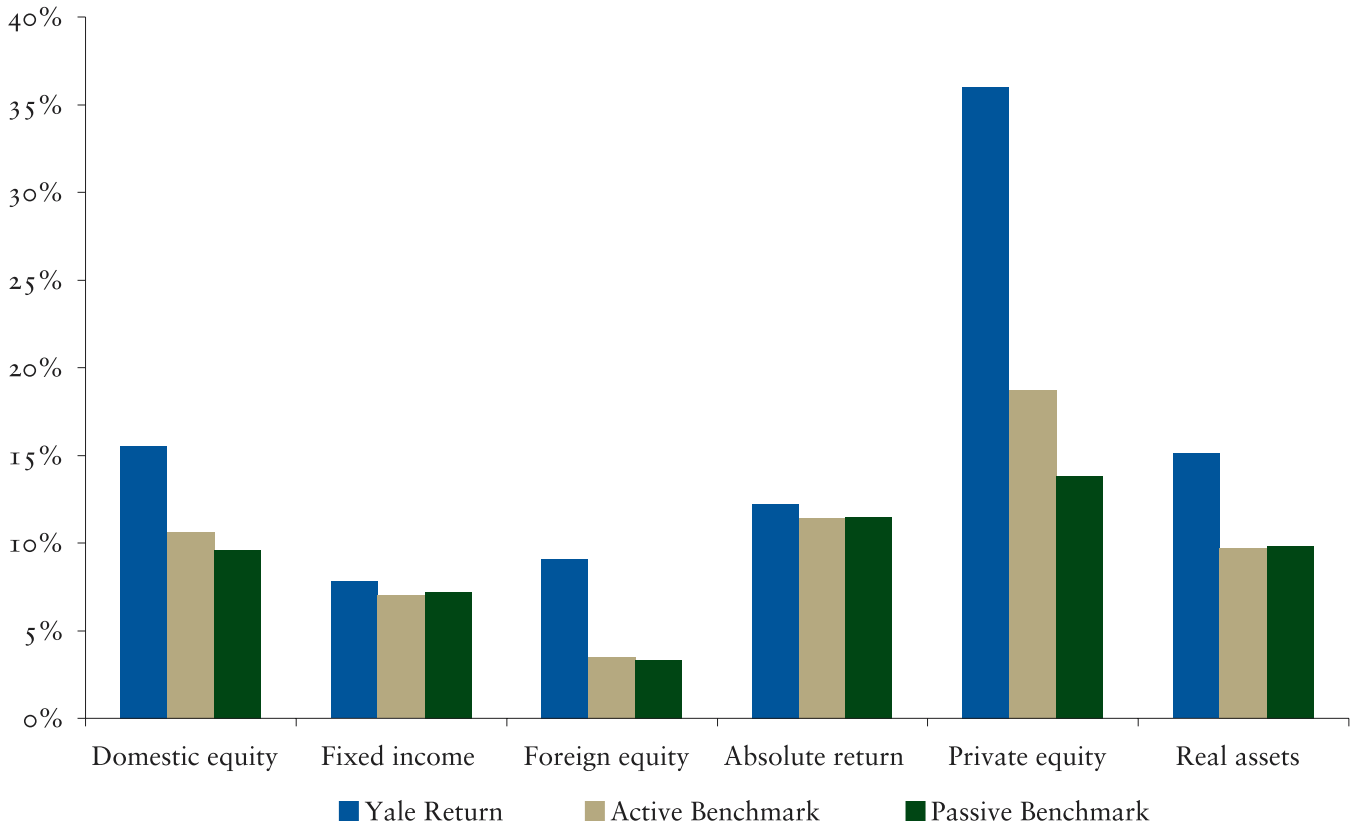
Over the past 15 years, Yale significantly reduced the Endowment's exposure to traditional domestic marketable securities, reallocating assets to nontraditional asset classes. In 1988, nearly three-quarters of the Endowment was committed to U.S. stocks, bonds, and cash. Today, this percentage is approximately 22.5%. Foreign equity, private equity, absolute return strategies, and real assets now represent 77.5% of the Endowment.

The heavy allocation to nontraditional asset classes stems from the diversifying power they provide to the portfolio as a whole. Alternative assets, by their nature, tend to be less efficiently priced than traditional marketable securities, providing an opportunity to exploit market inefficiencies through active management. Today's actual and target portfolios have significantly higher expected returns and lower volatility than 1988's portfolio.

Asset Class	June 2003	Current Target
Domestic equity	14.9%	15.0%
Fixed income	7.4%	7.5%
Foreign equity	14.6%	15.0%
Absolute return	25.1%	25.0%
Private equity	14.9%	17.5%
Real assets	20.9%	20.0%
Cash	2.1%	0.0%
Total	100.0%	100.0%

Yale Endowment

Asset classes versus benchmarks: annualized returns net of fees for ten years ended June 30, 2003



PRICEWATERHOUSECOOPERS

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Report of Independent Auditors

To the President and Fellows of
Yale University

In our opinion, the accompanying statement of financial position and the related statements of activities and of cash flows present fairly, in all material respects, the financial position of Yale University (the "University") as of June 30, 2003, and the changes in its net assets and its cash flows for the year then ended, in conformity with accounting principles generally accepted in the United States of America. These financial statements are the responsibility of the University's management; our responsibility is to express an opinion on these financial statements based on our audit. The prior year summarized comparative information has been derived from the University's 2002 financial statements; and in our report dated October 3, 2002, we expressed an unqualified opinion on those financial statements. We conducted our audit of these statements in accordance with auditing standards generally accepted in the United States of America, which require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

Our audit was conducted for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplemental statement of operations for the year ended June 30, 2003 with summarized information for the year ended June 30, 2002, is presented for purposes of additional analysis and is not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and, in our opinion, is fairly stated, in all material respects, in relation to the basic financial statements taken as a whole.

PricewaterhouseCoopers LLP

September 26, 2003

Yale University Statements of Financial Position

June 30, 2003 and June 30, 2002 ($ in thousands)

	2003	2002
Assets:		
Cash and cash equivalents	$ 422,561	$272,267
Accounts receivable, net	98,598	96,973
Contributions receivable, net	208,409	205,600
Student notes receivable, net	68,761	81,318
Investments, at market value	11,277,379	10,670,437
Beneficial interest in trust assets	106,601	80,628
Other assets	88,970	98,366
Land, buildings and equipment, net of accumulated depreciation	1,986,111	1,853,209
Total assets	**$ 14,257,390**	**$13,358,798**
Liabilities:		
Accounts payable and accrued liabilities	$ 246,105	$ 193,331
Advances under grants and contracts and other deposits	60,263	61,553
Accrued employee benefit liabilities	43,299	45,142
Liabilities under split-interest agreements	74,532	69,127
Bonds and notes payable	1,572,885	1,223,240
Advances from Federal government for student loans	32,256	31,720
Total liabilities	**2,029,340**	**1,624,113**
Net assets:		
Unrestricted	6,700,281	6,419,547
Temporarily restricted	4,003,675	3,910,190
Permanently restricted	1,524,094	1,404,948
Total net assets	12,228,050	11,734,685
Total liabilities and net assets	**$ 14,257,390**	**$ 13,358,798**

Detail of net assets:

	Unrestricted	Temporarily Restricted	Permanently Restricted	2003	2002
Endowment and student loan	$ 3,855,174	$ 3,538,223	$ 1,524,094	$ 8,917,491	$ 8,416,321
Funds functioning as endowment	2,051,177	95,218	-	2,146,395	2,110,689
Physical capital investment	507,037	207,076	-	714,113	794,311
Operating:					
Accumulated general budget deficit	(70,904)	-	-	(70,904)	(70,904)
Designated and restricted for specific purposes	357,797	163,158	-	520,955	484,268
	$ 6,700,281	**$ 4,003,675**	**$ 1,524,094**	**$ 12,228,050**	**$ 11,734,685**

The accompanying notes are an integral part of these financial statements.

Yale University Statement of Activities

for the year ended June 30, 2003 with summarized information for the year ended June 30, 2002
($ in thousands)

	Unrestricted	Temporarily Restricted	Permanently Restricted	2003	2002
Operating					
Revenues and reclassifications:					
Student income, net	$ 210,397	$ -	$ -	$ 210,397	$ 209,040
Grant and contract income, primarily for research and training	457,827	-	-	457,827	417,638
Medical services income	229,589	-	-	229,589	213,568
Contributions	18,486	45,719	-	64,205	86,024
Allocation of endowment spending from financial capital	144,697	325,400	-	470,097	415,020
Other investment income	17,434	-	-	17,434	26,544
Publications income	24,466	-	-	24,466	22,930
Other income	79,732	-	-	79,732	81,478
Total revenues and gains	1,182,628	371,119	-	1,553,747	1,472,242
Net assets released from restrictions	372,486	(372,486)	-	-	-
Total revenues and reclassifications	1,555,114	(1,367)	-	1,553,747	1,472,242
Expenses:					
Instruction and departmental research	433,466	-	-	433,466	396,405
Organized research	313,129	-	-	313,129	282,248
Patient care and other related services	227,084	-	-	227,084	218,435
Libraries and other academic support	140,827	-	-	140,827	130,151
Student aid and services	222,948	-	-	222,948	204,298
Public service	98,836	-	-	98,836	91,672
Administration and other institutional support	106,886	-	-	106,886	103,780
Total expenses	1,543,176	-	-	1,543,176	1,426,989
Increase (decrease) in net assets from operating activities	11,938	(1,367)	-	10,571	45,253
Non-operating					
Physical capital:					
Contributions	-	17,244	-	17,244	37,119
Unrealized (loss) on swap contracts	(57,823)	-	-	(57,823)	(10,252)
Other increases	953	-	-	953	2,895
Net assets released from restrictions	110,486	(110,486)	-	-	-
Increase (decrease) in net assets from physical capital activities	53,616	(93,242)	-	(39,626)	29,762
Financial capital:					
Contributions	55	3,082	89,544	92,681	100,393
Total endowment return, net of management fees	275,848	621,678	2,225	899,751	41,402
Other increases (decreases)	(55,291)	27,999	27,377	85	57,820
Allocation of endowment spending to operating	(144,697)	(325,400)	-	(470,097)	(415,020)
Net assets released from restrictions	139,265	(139,265)	-	-	-
Increase (decrease) in net assets from financial capital activities	215,180	188,094	119,146	522,420	(215,405)
Total increase (decrease) in net assets	280,734	93,485	119,146	493,365	(140,390)
Net assets, beginning of year	6,419,547	3,910,190	1,404,948	11,734,685	11,875,075
Net assets, end of year	$6,700,281	$4,003,675	$1,524,094	$12,228,050	$11,734,685

The accompanying notes are an integral part of these financial statements.

Yale University Supplemental Statement of Operations

for the year ended June 30, 2003 with summarized information for the year ended June 30, 2002
($ in thousands)

	Unrestricted					
	General Operating Budget	Designated for Specific Purposes	Totals	Temporarily Restricted	2003	2002
Revenues and reclassifications:						
Student income, net	$205,962	$ 4,435	$ 210,397	$ -	$ 210,397	$ 209,040
Grant and contract income, primarily for research and training	104,929	352,898	457,827	-	457,827	417,638
Medical services income	22,199	207,390	229,589	-	229,589	213,568
Contributions	18,486	-	18,486	45,719	64,205	86,024
Allocation of endowment spending from financial capital	99,631	45,066	144,697	325,400	470,097	415,020
Other investment income	14,152	3,282	17,434	-	17,434	26,544
Publications income	87	24,379	24,466	-	24,466	22,930
Other income and transfers	84,798	(5,066)	79,732	-	79,732	81,478
Total revenues and gains	550,244	632,384	1,182,628	371,119	1,553,747	1,472,242
Net assets released from restrictions and designations	124,381	248,105	372,486	(372,486)	-	-
Total revenues and reclassifications	**674,625**	**880,489**	**1,555,114**	**(1,367)**	**1,553,747**	**1,472,242**
Operating expenses and other decreases:						
Salaries and wages	304,093	414,240	718,333	-	718,333	670,241
Employee benefits	71,836	109,531	181,367	-	181,367	164,240
Materials and supplies	60,903	79,897	140,800	-	140,800	133,619
Services	59,948	91,520	151,468	-	151,468	144,251
Utilities	38,476	237	38,713	-	38,713	30,451
Student aid	14,611	34,201	48,812	-	48,812	43,880
Other operating expenditures	21,489	74,462	95,951	-	95,951	87,680
Interest on indebtedness	48,889	-	48,889	-	48,889	45,956
Depreciation and amortization expense	54,380	64,463	118,843	-	118,843	106,671
Total operating expenses	**674,625**	**868,551**	**1,543,176**	**-**	**1,543,176**	**1,426,989**
Increase (decrease) in net assets from operating activities	**$ -**	**$ 11,938**	**$ 11,938**	**$ (1,367)**	**$ 10,571**	**$ 45,253**

The accompanying notes are an integral part of these financial statements

Yale University Statements of Cash Flows

for the years ended June 30, 2003 and 2002 ($ in thousands)

	2003	2002
Operating activities:		
Change in net assets	$493,365	$(140,390)
Adjustments to reconcile change in net assets to net cash provided by (used in) operating activities:		
Depreciation and amortization	118,843	106,671
Net endowment (gains) losses and other increases	(620,734)	255,328
Contributions restricted for physical and financial capital	(95,788)	(107,882)
Other adjustments	4,538	(1,639)
Changes in assets and liabilities that provide (use) cash:		
(Increase) decrease in accounts receivable	(1,625)	5,384
(Increase) in contributions receivable	(2,809)	(45,809)
(Increase) decrease in other operating assets	2,134	(944)
Increase in accounts payable, accrued liabilities and deposits and advances	67,403	23,892
Net cash (used in) provided by operating activities	**(34,673)**	**94,611**
Investing activities:		
Student loans repaid	15,505	11,421
Proceeds from sale of student loans	20,307	12,945
Student loans granted	(24,272)	(22,819)
Purchases related to capitalized software costs and other assets	(5,034)	(9,243)
Proceeds from sale of investments	6,176,541	4,488,158
Purchases of investments	(6,188,722)	(4,488,452)
Purchases of land, buildings and equipment	(260,280)	(366,241)
Net cash used in investing activities	**(265,955)**	**(374,231)**
Financing activities:		
Contributions restricted for physical and financial capital	95,788	107,882
Contributions received for split-interest agreements	6,524	9,069
Payments made under split-interest agreements	(2,503)	(6,900)
Proceeds from long-term debt	350,000	287,595
Repayments of long-term debt	(617)	(88,111)
Interest earned and advances from Federal government for student loans	1,730	1,336
Net cash provided by financing activities	**450,922**	**310,871**
Net increase in cash and cash equivalents	150,294	31,251
Cash and cash equivalents at beginning of year	272,267	241,016
Cash and cash equivalents at end of year	**$422,561**	**$272,267**

The accompanying notes are an integral part of these financial statements.

Yale University
Notes to Financial Statements

1. Significant Accounting Policies

a. General
Yale University ("the University") is a private, not-for-profit institution of higher education located in New Haven, Connecticut. The University provides educational services primarily for students and trainees at the undergraduate, graduate and postdoctoral levels, and performs research, training and other services under grants, contracts and other similar agreements with agencies of the Federal government and other sponsoring organizations. The University's academic organization includes Yale College, the Graduate School of Arts and Sciences, ten professional schools and a variety of research institutions and museums. The largest professional school is the Yale School of Medicine, which conducts medical services in support of its teaching and research missions.

b. Basis of Presentation
The financial statements of Yale University include the accounts of all academic and administrative departments of the University, and certain affiliated organizations that are controlled by the University.

Financial statements of private, not-for-profit organizations measure aggregate net assets based on the absence or existence of donor-imposed restrictions. Three categories of net assets serve as the foundation of the accompanying financial statements. These classes are labeled unrestricted, temporarily restricted and permanently restricted net assets. Brief definitions of the three net asset classes are presented below:

Unrestricted Net Assets - Net assets derived from tuition and other institutional resources that are not subject to explicit donor-imposed restrictions. Unrestricted net assets also include a portion of the appreciation on endowment investments as described in subsequent paragraphs of this note.

Temporarily Restricted Net Assets - Net assets that are subject to explicit donor-imposed restrictions on the expenditure of contributions or income and gains on contributed assets. The temporary restrictions may expire due to the passage of time or the incurrence of expenditures that fulfill the donor-imposed restrictions. Temporarily restricted net assets are generally established in support of schools or departments of the University, often for specific purposes such as professorships, research, faculty support, scholarships and fellowships, library and art museums, building construction and other specific purposes.

Permanently Restricted Net Assets - Net assets that are subject to explicit donor-imposed stipulations that they be maintained permanently by the University. Generally, the donors of these assets permit the University to use the returns on the related investments over time for general or specific purposes.

The University's measure of operations as presented in the Statement of Activities includes income from tuition and fees, grants and contracts, medical services, contributions for operating programs, the allocation of endowment spending and other revenues. Operating expenses are reported on the Statement of Activities by functional categories, after allocating costs for operation and maintenance of plant, interest on indebtedness and depreciation expense.

The University presents non-operating activity as physical capital and financial capital, within the Statement of Activities. The physical capital section includes contributions and other activities related to land, buildings and equipment that are not included in the University's measure of operations. Similarly, the financial capital section includes contributions, investment returns and other activities related to endowment and student loan net assets utilized for long-term investment purposes. Financial capital also encompasses expendable contributions and the related accumulated appreciation that have been designated to function as endowment (i.e., funds functioning as endowment) by the Yale Corporation.

Administration of the University's endowment is subject to the general provisions of the Uniform Management of Institutional Funds Act (UMIFA or "the Act"). Under the provisions of this State law, a governing board may appropriate for expenditure, for the uses and purposes for which an endowment fund is established, so much of the net appreciation as is deemed prudent based on standards established by the Act. While a governing board must exercise ordinary business care in the appropriation of such appreciation, the general provisions of UMIFA do not mandate that institutions retain endowment gains permanently. Generally accepted accounting principles require institutions that are subject to general UMIFA provisions to report gains on endowment assets as increases in unrestricted net assets or temporarily restricted net assets based on the absence or existence of donor-imposed restrictions.

The Supplemental Statement of Operations, which is not required by generally accepted accounting principles, provides additional detail of the University's operating results by segregating activities that are an integral part of the University's general operating budget from other activities that are internally designated for specific purposes or uses. Expenses are reported by natural classification on the Supplemental Statement of Operations for informational purposes.

Recognizing the critical importance of maintaining its physical capital as well as its financial capital over many generations, the University began in the mid-1990's to allocate funds directly from the operating budget to a capital maintenance account. Significant effort has gone into estimating an annual equilibrium level funding target for internal purposes that would allow Yale's facilities to be maintained in

excellent condition on a consistent basis, thus avoiding deferred maintenance and the need to make catch-up investments in facilities at a later date. While not an exact science, an estimate of the full capital replacement equilibrium level for 2003 is $141 million. The University spent $161 million on the renovation of its facilities in 2003, of which $83 million was provided from operating funds, and the remainder from capital gifts and debt. Over time, it is the University's intent to increase the annual funding of capital replacement costs from the operating budget until such funding reaches the estimated full capital replacement equilibrium level.

c. Cash and Cash Equivalents
Cash and cash equivalents are recorded at fair value and include institutional money market funds and similar temporary investments with maturities of three months or less. Cash and cash equivalents representing investments purchased with endowment net assets are reported as investments. At June 30, 2003 cash and cash equivalents classified as investments were $303.2 million.

d. Investments
The University's investments are recorded in the financial statements at fair value. The value of publicly traded fixed income and equity securities is based upon quoted market prices and exchange rates, if applicable. The fair value of significant direct real estate investments is determined from periodic valuations prepared by independent appraisers.

Fair values for certain private equity and real estate investments held through limited partnerships or commingled funds are estimated by the respective external investment managers if market values are not readily ascertainable. These valuations necessarily involve assumptions and methods that are reviewed by the University's Investments Office. The University records the cost of managing its endowment portfolio as a decrease in financial capital within the appropriate net asset class in the Statement of Activities.

The University invests its endowment investment portfolio and allocates the related earnings for expenditure in accordance with the total return concept. A distribution of endowment return that is independent of the cash yield and appreciation of investments earned during the year is provided for program support. The University has adopted an endowment spending policy designed specifically to stabilize annual spending levels and to preserve the real value of the endowment portfolio over time. The spending policy attempts to achieve these two objectives by using a long-term targeted spending rate combined with a smoothing rule, which adjusts spending gradually to changes in the endowment market value. The Yale Corporation approved a long-term targeted spending rate of 5.0 percent effective beginning in fiscal 1996. The actual rate of spending for 2003 and 2002, when measured against the previous year's market value, was 4.47 percent and 3.82 percent, respectively. Actual rates have been lower than long-term targets in recent years due to strong investment returns.

e. Derivatives
Derivative financial instruments are recorded at fair value with the resulting gain or loss recognized in the Statement of Activities.

f. Land, Buildings and Equipment
Land, buildings and equipment are generally stated at cost and are presented net of accumulated depreciation. Annual depreciation is calculated on a straight-line basis over useful lives ranging from 15 to 50 years for buildings and improvements and 4 to 12 years for furnishings and equipment.

g. Other Assets
Capitalized software and bond issuance costs are categorized within other assets in the financial statements. Bond issuance costs are amortized over the term of the related debt and capitalized software costs are amortized over the estimated useful lives of the software, ranging from 5 to 10 years.

h. Collections
Collections at Yale include works of art, literary works, historical treasures and artifacts that are maintained in the University's museums and libraries. These collections are protected and preserved for public exhibition, education, research and the furtherance of public service. Purchases of such collections are recorded as operating expenses in the period in which the items are acquired.

i. Split-Interest Aqreements
The University's split-interest agreements with donors consist primarily of charitable gift annuities, pooled income funds and irrevocable charitable remainder trusts for which the University serves as trustee. Assets are invested and payments are made to donors and/or other beneficiaries in accordance with the respective agreements.

Contribution revenues for charitable gift annuities and charitable remainder trusts are recognized at the dates the agreements are established. In addition, the present values of the estimated future payments to be made to the beneficiaries under these agreements are recorded as liabilities. For pooled income funds, contribution revenue is recognized upon establishment of the agreement at the fair value of the estimated future receipts, discounted for the estimated time period until culmination of the agreement. The discount rates used to calculate these liabilities approximated a risk-free rate.

j. Beneficial Interest in Trust Assets
The University is the beneficiary of certain perpetual trusts and charitable remainder trusts held and administered by others. The estimated fair value of trust assets are recognized as assets and as gift revenue when the trusts are established or when reported to the University.

k. Tuition and Fees
Tuition and fees revenue, which is included in student income on the Statement of Activities, is generated from an enrolled student population of approximately 11,200. The undergraduate population of 5,307 is a diverse group attracted from across the United States and from many foreign countries. Foreign students account for approximately 8 percent of the undergraduate population. Net tuition revenue from undergraduate enrollment represents approximately 62 percent of total net tuition revenue.

The University maintains a policy of offering qualified applicants admission to Yale College without regard to financial circumstance as well as meeting in full the demonstrated financial need of those admitted. Student need in all programs throughout the University is generally fulfilled through a combination of scholarships and fellowships, loans and employment during the academic year. Tuition and fees have been reduced by certain scholarships and fellowships in the amounts of $107.4 million and $91.6 million in 2003 and 2002, respectively.

l. Contributions
Unconditional promises to give that are expected to be collected within one year are recorded at their net realizable value. Amounts expected to be collected in future years are recorded at the present value of estimated future cash flows. The discounts on those contributions are computed using a risk-free interest rate applicable to the year in which the promise is received. Amortization of the discount is included in contribution revenue. Conditional promises to give are not included as support until such time as the conditions are substantially met. A facilities and administrative charge is assessed against current use gifts when received.

m. Grant and Contract Income
The University receives grant and contract income from governmental and private sources. In 2003 and 2002, grant and contract income received from the Federal government totaled $365.7 million and $334.7 million, respectively. The University recognizes revenue associated with the direct costs of sponsored programs as the related costs are incurred. Recovery of facilities and administrative costs of Federally sponsored programs is at rates negotiated with the University's cognizant agency, the Department of Health and Human Services. The University and the Federal government are currently operating under an agreement that establishes facilities and administrative cost reimbursement rates under Federal grants and contracts through June 30, 2005.

n. Medical Services Income
The University has agreements with third-party payors, including health maintenance organizations, that provide payment for medical services at amounts different from standard rates established by the University. Medical services income is reported net of contractual allowances from third-party payors and others for services rendered, and further adjusted for estimates of uncollectible amounts.

o. Net Assets Released from Restrictions
Reclassification of net assets is based upon the satisfaction of the purpose for which the net assets were restricted or the completion of a time stipulation. Restricted contributions and net investment returns earned are reported as temporarily restricted support and reclassified to unrestricted when any donor-imposed restrictions are satisfied. Restricted net assets associated with physical capital assets are reclassified to unrestricted net assets when the capital asset is placed in service.

p. Use of Estimates
The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and judgments that affect the reported amounts of assets and liabilities and disclosures of contingencies at the date of the financial statements and of revenues and expenses recognized during the reporting period. Actual results could differ from those estimates.

q. 2002 Financial Statement Presentation
Comparative summarized information for the year ended June 30, 2002 presented in the Statement of Activities does not include sufficient detail by net asset class to constitute a presentation in conformity with generally accepted accounting principles. In addition, certain amounts have been reclassified to conform to the current-year presentation.

2. Investments

As described in Note 1d, investments are generally shown in the financial statements at market or appraised value. The market values of the University's investments (excluding non-endowment cash and cash equivalents as described in Note 1c) are presented below, as of June 30, in thousands of dollars:

	2003	2002
Endowment:		
Domestic equities	$ 1,694,521	$ 1,604,276
Absolute return	2,728,955	2,752,881
Private equities	1,626,159	1,494,589
Fixed-income	813,820	931,245
Real assets	2,425,809	2,270,289
International equities	1,590,718	1,331,647
	10,879,982	10,384,927
Assets held in trust:	62,308	57,109
Other investments:		
Fixed-income	257,367	141,698
Other	77,722	86,703
	335,089	228,401
Total Investments	$11,277,379	$10,670,437

Fixed income investments in the non-endowment portfolio include $172.2 million of CHEFA X proceeds at June 30, 2003 and $114.4 million of CHEFA V proceeds at June 30, 2002 available for approved construction and campus renovation projects.

The University's split-interest assets as described in footnote 1i and included in investments comprise the following components, in thousands of dollars:

	2003	2002
Charitable gift annuities	$ 63,220	$ 58,588
Pooled income funds	23,269	24,652
Charitable remainder trusts	62,308	57,109
	$ 148,797	$ 140,349

The University has developed a diversified endowment investment portfolio with a strong orientation to equity investments and to strategies designed to take advantage of market inefficiencies. The University's investment objectives are guided by its asset allocation policy and are achieved in partnership with external investment managers operating through a variety of vehicles, including separate accounts, limited partnerships and commingled funds.

The University may employ derivatives and other strategies to (1) hedge against market risks, (2) arbitrage mispricings of related securities and (3) replicate long or short positions more cost effectively. Accordingly, derivatives in the investment portfolio may include currency forward contracts, interest rate and currency swaps, call and put options, debt and equity futures contracts, equity swaps and other vehicles that may be appropriate in certain circumstances. Since Yale does not strive for higher returns through market timing or by making leveraged market bets, derivatives are not used for speculation.

Yale's derivative positions directly held at June 30, 2003 included interest rate swaps, and currency forward contracts. The market value of these derivatives was $29.9 million. A gain of $8.1 million related to these transactions is included within total endowment return in the Statement of Activities. Derivatives held by limited partnerships and commingled investment trusts in which Yale invests pose no off-balance sheet risk to the University due to the limited liability structure of the investments.

Certain investment transactions, including derivative financial instruments, necessarily involve counterparty credit exposure. Such exposure is monitored regularly by the University's Investments Office in accordance with established credit policies and other relevant criteria.

At June 30, 2003, approximately 60.0 percent of the University's endowment investments were invested in limited partnerships or limited liability corporations. Under the terms of certain limited partnership agreements for private equity and real estate investments, the University is obligated to remit additional funding periodically as capital calls are exercised. At June 30, 2003, the University had uncalled commitments of approximately $2.2 billion. Such commitments are generally called over a period of years and contain fixed expiration dates or other termination clauses.

The University has various sources of internal liquidity at its disposal, including cash, cash equivalents and marketable debt and equity securities. If called upon on June 30, 2003, management estimates that it could have liquidated approximately $2.9 billion to meet short-term needs.

A summary of the University's total investment return as reported in the Statement of Activities is presented below, in thousands of dollars:

	2003	2002
Investment income	$289,143	$357,380
Realized and unrealized gains (losses), net of investment management fees	610,608	(315,978)
Return on the endowment	$899,751	$ 41,402
Other investment income	17,434	26,544
Total return on investments	$917,185	$ 67,946

Endowment investment returns totaling $470.1 million and $415.0 million were allocated to operating activities in 2003 and 2002, respectively, using the spending policy described in Note 1d.

3. Accounts Receivable

Accounts receivable from the following sources were outstanding at June 30, in thousands of dollars:

	2003	2002
Medical services	$ 35,582	$ 30,795
Grants and contracts	38,479	36,405
Investment income receivable	10,273	12,733
Affiliated organizations	14,020	10,350
Yale University Press receivables	5,528	7,752
Other	11,445	11,763
	115,327	109,798
Less: Allowance for doubtful accounts	(16,729)	(12,825)
	$ 98,598	$ 96,973

Medical services receivables are net of an allowance for contractual reserves in the amount of $28.0 million and $26.1 million at June 30, 2003 and 2002, respectively.

The University and Yale-New Haven Hospital ("the Hospital") are parties to an affiliation agreement that establishes guidelines for the operation of activities between these two separate organizations. These guidelines set forth each organization's responsibility under the common goal of delivering comprehensive patient care services. Under the terms of the arrangement, the Hospital is responsible for providing a clinical setting and clinical support for the University to carry out its teaching and research missions. The University provides professional services from faculty of the Yale School of Medicine and a variety of other administrative and clinical services.

The net receivable from the Hospital amounted to $6.1 million and $4.5 million at June 30, 2003 and 2002, respectively. Balances are settled in the ordinary course of business.

4. Contributions Receivable

Contributions receivable consists of the following unconditional promises to give as of June 30, in thousands of dollars:

	2003	2002
Purpose:		
Endowment	$ 66,508	$ 58,740
Capital purposes	126,820	121,914
Operating programs	81,160	95,734
Gross unconditional promises to give	274,488	276,388
Less: Discount	(30,922)	(34,961)
Allowance for uncollectible accounts	(35,157)	(35,827)
Net unconditional promises to give	$208,409	$205,600
Amounts due in:		
Less than one year	$ 47,360	$ 42,461
One to five years	172,961	173,463
More than five years	54,167	60,464
Total	$274,488	$276,388

Discount rates used to calculate the present value of contributions receivable ranged from .98 percent to 6.60 percent at June 30, 2003, and from 2.83 percent to 6.60 percent at June 30, 2002.

5. Student Notes Receivable

Student notes and interest receivable at June 30, in thousands of dollars, include:

	2003	2002
Stafford Loan Program	$14,306	$25,069
Perkins Loan Program	32,442	34,186
YSL Loan Program	20,059	19,583
Other student loan notes	5,019	5,523
	71,826	84,361
Less: Allowance for doubtful accounts	(3,065)	(3,043)
	$68,761	$81,318

Student notes receivable include donor-restricted and Federally-sponsored student loans with mandated interest rates and repayment terms subject to significant restrictions as to their transfer and disposition. Yale Student Loans (YSL) are made with University funds to meet demonstrated needs in excess of all other sources of student loan borrowings. Interest accrues at fixed rates upon loan initiation. Amounts received from the Federal government to fund a portion of the Perkins student loans are ultimately refundable to the Federal government and have been reported as refundable advances in the Statements of Financial Position. The fair value of student loan instruments could not be determined without incurring excessive costs.

6. Other Assets

Other assets at June 30, in thousands of dollars, include:

	2003	2002
Software costs, net of accumulated amortization	$62,555	$70,514
Inventories	13,780	14,046
Bond issue costs, net of accumulated amortization	5,726	5,029
Other notes receivable	844	1,021
Deferred expenses	6,065	7,756
	$88,970	$98,366

Amortization expense included in operating expenses amounted to $12.3 million and $11.7 million in 2003 and 2002, respectively.

7. Land, Buildings and Equipment

Land, buildings and equipment at June 30, less accumulated depreciation, in thousands of dollars, are as follows:

	2003	2002
Land and real estate improvements	$ 74,759	$ 72,045
Buildings	2,306,086	1,876,308
Equipment	360,183	423,514
Construction in progress	171,223	404,113
	2,912,251	2,775,980
Less: Accumulated depreciation	(926,140)	(922,771)
	$1,986,111	$1,853,209

Depreciation expense included in operating expenses amounted to $106.5 million and $94.9 million in 2003 and 2002, respectively.

8. Bonds and Notes Payable

Bonds and notes payable of the University at June 30, in thousands of dollars, consist of:

	2003	2002
Facilities financing	$1,543,885	$1,193,807
Student loan financing	29,000	29,158
Other	-	275
	$1,572,885	$1,223,240

Total interest expense incurred on indebtedness was $52.4 million and $49.4 million in 2003 and 2002, respectively. Interest capitalized to land, buildings and equipment totaled $2.7 million in both 2003 and 2002.

a. *Facilities*

The University has entered into various agreements to finance its facilities additions, renovations and improvements. Bonds and notes payable outstanding for such purposes at June 30, in thousands of dollars, include:

	Effective Interest Rate 2003	Year of Maturity	Principal Outstanding 2003	2002
Connecticut Health and Educational Facilities Authority (CHEFA) tax-exempt bonds				
Series S	1.19%	2027	$135,865	$ 135,865
Series T	1.15%	2029	250,000	250,000
Series U	1.13%	2033	250,000	250,000
Series V	1.15%	2036	200,000	200,000
Series W	5.13%	2027	87,672	87,595
Series X	2.18%	2037/2042	350,000	-
Total CHEFA bonds			1,273,537	923,460
Medium-term notes	7.38%	2096	113,388	113,380
Taxable commercial paper	1.50%	2003	152,094	151,758
Other notes payable	3.00%-7.90%	2004/2020	4,866	5,209
			$1,543,885	$1,193,807

In January of 2003, the University issued $350 million of Series X tax-exempt bonds. The proceeds will be used to finance qualifying capital projects. Series X bonds consist of 1) $100 million Series X-1 bonds at a fixed interest rate of 5%. Series X-1 bonds mature on July 1, 2042, and are subject to an optional redemption on July 1, 2013; 2) $125 million Series X-2 variable rate bonds, currently bearing interest at a weekly rate; 3) $125 million Series X-3 variable rate bonds, currently bearing interest at a daily rate. Series X-2 and X-3 bonds mature on July 1, 2037. Series X-2 and X-3 bonds may be converted to other variable rate modes or to a fixed rate at the discretion of the University. Series X-2 bonds may be tendered for purchase on any business day with seven days notice. Series X-3 bonds may be tendered for purchase on any business day.

CHEFA Series W bonds bear interest at a fixed interest rate of 5.125%. The proceeds of Series W were used to refinance CHEFA Series Q and R bonds of $87,600,000. Yale exercised its option to redeem the series Q and R bonds, which had a 6% fixed interest rate, on June 17, 2002. The refinancing required the payment of a call premium in the amount of $1.7 million. Series W bonds mature on July 1, 2027, and are subject to an optional redemption in July of 2009. The original issuance discount associated with this issuance is $1,924,680, which will be amortized over the 25-year life of the bond.

CHEFA Series V bonds currently bear interest at a daily rate and mature on July 1, 2036. The bonds may be converted from a daily rate period to other variable rate modes or to a fixed rate mode at the discretion of the University. The bonds may be tendered for purchase on any business day.

CHEFA Series U bonds and one-half of Series T currently bear interest at a weekly rate. The bonds may be converted from the weekly rate period to other variable-rate modes or to a fixed-rate mode at the discretion of the University. In the weekly mode, bonds may be tendered for purchase on any business day with seven days notice. On September 4, 2001, the University converted half of CHEFA Series T from a weekly mode to a daily mode. Series T bonds in daily mode may be tendered for purchase on any business day.

CHEFA Series S bonds currently bear interest at a money market municipal rate and are outstanding for varying interest rate periods of 270 days or less. The bonds may be converted from the money market mode to other variable rate modes or to a fixed rate mode at the discretion of the University. In the current money market mode, bonds may be tendered for purchase at the end of each rate period.

Medium-term notes in the amount of $113.4 million are recorded net of a discount at June 30, 2003. The notes mature in the year 2096, with a call provision in the year 2026. The bonds bear interest at a fixed rate of 7.375%.

Commercial paper consists of notes issued in the short-term taxable market, and is sold at a discount from par. The maturities of individual notes are issued in ranges from one day to no more than one year, and fall on average in a range of sixty to ninety days.

Scheduled maturities of the facilities bonds and notes payable for the next five fiscal years, in thousands of dollars, are as follows:

2004	$349
2005	252
2006	150
2007	162
2008	175

Commercial paper borrowings have no scheduled maturities. The University may choose to retire some or all of the outstanding commercial paper over the next five years.

During fiscal year 2003, the University entered into a 364-day revolving credit agreement totaling $200 million to provide alternative liquidity to support Yale's variable rate demand notes.

b. *Student Loan*
Commercial paper utilized to finance student loan notes was $29.0 million in 2003 and $29.2 million in 2002, with an effective interest rate of 1.50% for 2003 and 2.50% for 2002.

c. *Interest Rate Swaps*
The University has entered into various interest rate swap agreements to manage the interest cost and risk associated with its variable rate debt portfolios. During fiscal year 2003, Yale entered into additional swap agreements with notional principal amounts totaling $25 million. Under the terms of these agreements, the University pays fixed rates, ranging from 4.64% to 6.54%, determined at inception, and receives the 3-month LIBOR on the respective notional principal amounts. The following schedule presents swap agreements in force related to this strategy at June 30, 2003 in thousands of dollars:

	Notional Amount	Market Value	Net Interest 2003	Expense 2002	Expiration Date
Facilities	$480,000	$(77,483)	$20,015	$15,524	2004-2041
Student loan	-	-	497	280	
	$480,000	$(77,483)	$20,512	$15,804	

These financial instruments involve counterparty credit exposure. The counterparties for these swap transactions are major financial institutions that meet the University's criteria for financial stability and credit-worthiness.

d. *Fair Value*
The fair value of the University's fixed rate bonds, $351.0 million at June 30, 2003, is estimated based on quoted market prices for the same or similar issues. The carrying value of commercial paper and variable rate bonds and notes payable, which reflects varying interest rate periods, on average 90 days, approximates fair value because of the short-term maturity of these instruments.

9. Pension Plans—Defined Contribution

The University maintains the Yale University Retirement Annuity Plan as a contributory plan for faculty and certain staff employees. Participants may direct employee and employer contributions to the Teachers' Insurance and Annuity Association (TIAA) and College Retirement Equities Fund (CREF), as well as other investment options. Pension expense for this plan was $41.5 million and $37.7 million in 2003 and 2002, respectively.

10. Pension and Postretirement Plans—Defined Benefit

The University has a noncontributory, defined benefit pension plan for staff employees. Benefits are based on years of participation and the employee's highest annual rate of earnings during the last five years of employment. Annual contributions to the plan are made by the University based upon calculations prepared by the plan's actuary.

The University provides comprehensive health care benefits for retired employees and their eligible dependents through a defined benefit plan. While the University's subsidy of these costs differs among retiree groups, substantially all employees who meet minimum age and service requirements and retire from the University are eligible for these benefits.

The University has created a trust to provide for the funding of postretirement medical benefits. Annual contributions are determined by the University and are deposited to the trust quarterly.

Net periodic benefit cost for defined benefit plans includes the following components, in thousands of dollars:

Net periodic benefit cost for the fiscal year ended	Pension Benefits		Postretirement Benefits	
	2003	2002	2003	2002
Service cost	$ 9,038	$ 8,402	$ 9,555	$ 7,560
Interest cost	20,596	19,435	16,829	14,038
Expected return on plan assets	(35,350)	(31,496)	(10,917)	(9,207)
Net amortization				
- Transition obligation	517	587	3,976	3,976
- Prior service cost	1,206	1,251	-	-
- Net (gain) loss	(4,018)	(2,870)	3,602	2,121
Net periodic (benefit) cost	$ (8,011)	$(4,691)	$23,045	$ 18,488

The following table sets forth the Pension and Postretirement plans' funded status and provides a reconciliation to the accrued liability reported in the Statements of Financial Position at June 30, in thousands of dollars:

Plans' Funded Status	Pension Benefits		Postretirement Benefits	
	2003	2002	2003	2002
Change in benefit obligation:				
Benefit obligation, beginning of year	$298,949	$288,317	$ 245,274	$ 204,984
- Service cost, excluding assumed administration expenses	8,637	8,002	9,385	7,410
- Interest cost	20,596	19,435	16,829	14,038
- Benefit payments	(13,149)	(12,634)	(9,971)	(8,017)
- Assumption changes	33,343	-	20,282	23,974
- Amendments	13	-	5,728	-
- (Gain) loss	1,919	(4,171)	6,533	2,885
Benefit obligation, end of year	$350,308	$298,949	$ 294,060	$ 245,274
Change in plan assets:				
Market value, beginning of year	$419,934	$420,899	$ 109,282	$ 93,624
- Actual return on plan assets	39,863	12,046	5,760	9,806
- University contributions	-	-	23,174	14,032
- Benefits and expenses paid	(13,829)	(13,011)	(10,232)	(8,180)
Market value, end of year	$445,968	$419,934	$ 127,984	$ 109,282
Funded status	$ 95,660	$120,985	$(166,076)	$(135,992)
Unrecognized transition obligation	-	517	39,757	43,732
Benefit payments advanced	-	-	2,051	3,221
Unrecognized net (gain) loss	(88,293)	(123,340)	108,658	80,196
Unrecognized prior service cost	8,724	9,918	5,728	-
Prepaid (accrued) benefit cost included in the Statements of Financial Position	$ 16,091	$ 8,080	$ (9,882)	$ (8,843)

Changes in assumptions during the current year affecting the benefit obligations of the plans are as follows:

	Pension	Postretirement
Discount rate - from 7% to 6.25%	$33,343	$31,190
Cost of living adjustment - from 4% to 3%	-	(7,958)
Eliminate Medicare risk HMO participation	-	(2,950)

In June 2002 the change in the projected health care cost trend assumption and the extension of the date when the ultimate trend rate will be achieved resulted in a $23.9 million increase in the benefit obligation of the Postretirement plan.

Assumptions used in determining the net periodic costs of the Pension and Postretirement plans are:

	2003	2002
Weighted-average discount rate	7.00%	7.00%
Expected long-term rate of return	9.25%	9.25%
Compensation increase	4.50%	4.50%
Health care cost increase	10.00%	6.00%

Assumptions used in determining the obligation of the Pension and Postretirement plans are:

	2003	2002
Weighted-average discount rate	6.25%	7.00%
Increase in future compensation levels	4.50%	4.50%
Projected health care cost trend rate	9.00%	10.00%
Ultimate trend rate	5.00%	5.00%
Year ultimate trend rate is achieved	2008	2008

The expected return assumption will be decreased to 8.5% for fiscal 2004. This change will have the effect of increasing expense by $3.1 million for the pension plan and $1.0 million for the postretirement plan in fiscal 2004.

The health care cost trend rate assumption has a significant effect on the amounts reported. For 2003, a 1 percent change in the health care cost trend rate structure would cause the Postretirement plan's benefit obligation at June 30, 2003 to change by approximately 11.7 percent and would also cause the sum of the service cost and interest cost components of postretirement expense to change by approximately 14.0 percent.

11. Subsequent Event

On September 18, 2003 the University announced an eight-year contract settlement with Locals 34 and 35 of the Hotel Employees and Restaurant Employees International Union. The contract includes scheduled wage increases of 3.6% to 4.6% per year over the next four years escalating by 1% a year over the remainder of the contract. Increases in pension benefits, including other employee groups, are expected to have the effect of increasing next year's pension expense by $10.8 million. In addition, settlement payments will be made to all employees represented by these Unions. The settlement payment amounted to approximately $12.0 million and has been included as an accrued liability at June 30, 2003 and an operating expense of $6 million for fiscal year 2003 and 2002, respectively.

12. Commitments and Contingencies

The University is involved in various legal actions arising in the normal course of activities and is subject to periodic audits and inquiries by various regulatory agencies. Although the ultimate outcome is not determinable at this time, management, after taking into consideration advice of legal counsel, believes that the resolution of these pending matters will not have a materially adverse effect, individually or in the aggregate, upon the University's financial statements.

In the normal course of business, the University leases facilities under non-cancellable operating leases. Minimum lease payments under these agreements over the next five years, in thousands of dollars, are as follows:

2004	$7,151
2005	5,477
2006	4,779
2007	4,139
2008	3,617

The University has entered into certain agreements to guarantee the debt and financial commitments of others. Under these agreements if the original debt holder defaults on the debt the University may be required to satisfy all or part of the remaining obligation. The total amount of these guarantees is approximately $18 million at June 30, 2003.

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