Upward Bound

Mathematician-biologist Simon Tavaré studies the evolutionary genetics of primates with natural historians, DNA chip technology with molecular biologists, and the vagaries of cancer with medical scientists — all while advancing his own field of computational biology. Marine biologist Dave Caron works with nanotechnologists and artificial intelligence experts to better study toxic algae blooms.

And neuroscientist-engineer Ted Berger bridges the worlds of biology and technology, basic science and applied engineering, and tissue and silicon in his efforts to bioengineer a brain chip.

These are just a few of the varied collaborations undertaken by life scientists at USC College as part of a research network that stretches across traditional disciplines, schools and campuses. From the network’s many hubs and connections emerge the unique qualities of innovation and synergy that define the College’s dynamic life sciences research community.

“The College is already a leader in several important scientific fields, and we are poised to excel in key areas of the life sciences,” says Joseph Aoun, dean of the College. “The work is not yet done, but we now have the momentum to push on to the next tier of excellence.”

Signs of growth abound: New life scientists have been recruited and hired. Plans have been made for a new 100,000 square-foot research facility dedicated to computational and molecular biology. There are plans for a sharp increase in the number of life sciences faculty and students in the College.

“With the completion of the Human Genome Project, this is one of the most exciting eras in biology, and probably the most exciting time to be a biologist at USC,” says Donal Manahan, USC College dean of research and professor of biological sciences.

Neuroscientist Sarah Bottjer, who chairs the biological sciences department, echoes Manahan’s enthusiasm. “USC life sciences have been incredibly energized by the hiring of a large number of outstanding faculty over the past four years,” she says.

Life sciences at USC College

In 1994, USC made a commitment to expand and strengthen its life sciences research enterprise, explains Beth Meyerowitz, dean of the College. “The university identified a way to do this — encourage interdisciplinary faculty interaction. USC has built the foundation for the vibrant, innovative life science research community, and the College lies at the heart of the university’s plan.”

In the College, biological sciences serves as the linchpin of the life sciences, says Bottjer. The department is made up of three strong divisions — molecular and computational biology, neurobiology, and marine environmental biology.

“These are the areas in which the College already excels and niches we can further exploit,” says Aoun. Notably, they are all built on a collaborative, interdisciplinary model.

Molecular and Computational Biology

In the division of molecular and computational biology, home to the USC Center for Computational and Experimental Genomics, computational biologists work alongside experimentalists...
A MESSAGE FROM THE DEAN

A Setting for Synergy

In mid-September, close to deadline for this issue of the College Magazine, I announced a new “Senior Faculty Initiative” that is designed to propel USC College to the top ranks of private American colleges by the end of the decade. A story on Page 19 describes the initiative. I hasten to point out that it is just one of the many innovative steps we will be taking to assure our continued growth in excellence.

New building for molecular and computational biology

We do a lot of talking in the College about interdisciplinary research. Now we’re about to put a building where our mouth is.

We will soon break ground on a new science building containing 100,000 square feet of state-of-the-art laboratory space. I say ours in the plural because for the first time — perhaps anywhere — we will place in close proximity two once-separate and distinct disciplines:

• computational scientists who are for the most part mathematicians and computer specialists,
• experimental biologists, the molecular biologists and biochemists who work at lab benches and test model systems.

They are “dry lab” people and “wet lab” people. Here at USC College they are working together with great success under the umbrella of the Center for Experimental Genomics and Computational Biology. But there has been little “central” about the Center.

For two decades, these scientists have collaborated because of their passion, shared interest in learning more about the fundamentals of life — how genes work, how genes work together in life systems, what causes life systems to fail.

We expect the new building to be completed in 2004, and when it is these collaborating scientists now scattered throughout the College will come together in a magnificent setting — magnificent because it has been designed to stimulate and support interdisciplinary research. A computational biologist, for instance, will be able to stroll a few feet from his or her computer and compare ideas with a scientist running wet lab experiments on model systems.

Proximity makes a difference, even in this age of e-mail, instant messaging, telephones or voice mail.

The synergy among our scientists will be built into the building. We have grown accustomed to great achievements from these scientists. But they are just beginning their paths to greatness.

Focus on the life sciences

This issue of The College Magazine stresses the life sciences, an area of great strength at USC. It might surprise some people that the College is so rich in all of the sciences, but especially in the life sciences.

Science has been a main course on the menu of the College for more than 100 years. But it was just under a decade ago that the university made a commitment to focus on the life sciences. At the heart of that commitment are the interdisciplinary interactions and collaborations that have gained for USC scientists a reputation for groundbreaking research.

These collaborations stretch across all USC schools and campuses, from engineering and dentistry here at University Park, to cancer biology, genetic medicine, clinical medicine, psychiatry and pharmacology at the Health Sciences Campus, and genomics and proteomics at Children’s Hospital Los Angeles, another bastion of excellent USC faculty.

They also reach across the country, to Boston and New York, San Diego and San Francisco, and around the world, to Europe and Asia.

The life sciences have captured the imagination of scientists everywhere, and that is fortunate for us because we all have a stake in the effort to combat diseases that are the scourge of society, from AIDS to Alzheimer’s.

Here in the College, as can be seen in the articles in this issue of the magazine, our expertise focuses on the areas of computational biology, neuroscience, molecular biology and marine biology.

The impact of our scientists’ contributions are felt close to home — in Orange County, marine biologists from the College are helping solve vexing pollution problems that are affecting popular swimming beaches — and globally, because everyone is reaping benefits from the Human Genome Project, built in part on fundamental work by USC scientists.

Joseph Aoun
Dean of the College
Anna H. Bing Dean’s Chair

Challenges Follow Glory

Within weeks, a new science building for USC College will be under construction on the parking lots in front of Kaprielian Hall.

The implications are enormous for human health, especially when one considers that one of the principal groups that will be housed there — computational biology — has provided the underpinning for one of the greatest achievements in the history of science, the Human Genome Project.

It is the pioneering work of Mike Waterman, Simon Tavarez, Norman Arnheim and their colleagues at USC and elsewhere that has made this possible.

Waterman’s mathematicians wizardry sorted out the millions of genome fragments generated by PCR, the polymerase chain reaction co-invented by Arneheim. The combination of the two provided the tools for thousands of researchers around the world to focus on sequencing the genome.

One should not think of computational biology as an arcane, strictly basic science. It has serious, practical applications for medical science.

Members of the Center for Computational and Experimental Genomics have numerous collaborations with physician-scientists at the Keck School of Medicine of USC, for example, and are examining the genetics of cancer and diseases of the brain such as Huntington’s.

Waterman, Tavarez, Arnheim, and their associates, did their early work at a time when scientific equipment was rudimentary, relative to what’s available today. Our computational biologists, molecular biologists and experimental genomics researchers have been scattered about the campus in little cottage-industry groupings.

It boggles the mind to ponder what giant steps these scientific giants will take when they are in an environment where there is the latest equipment and the computational types are working side by side with experimentalists, sharing data in real-time with each other and with researchers focusing on specific diseases. Further, it’s exciting to know that this prestigious core group will help to attract new faculty, doubling the size of USC’s impressive programs.

The advances in research that will take place in the new building will directly advance cancer research because several of the leading faculty members in computational biology have active collaborations with cancer researchers at USC and elsewhere.

And the building will provide a focal point for area-wide collaborations that will make downtown Los Angeles the nexus for computational research for the entire nation.

Without doubt, an illustrious chapter in the history of USC is about to be written.

The worth is evident: USC College’s bioinformatics faculty is head and shoulders ahead of the competition.

The urgency is likewise evident: If USC is to continue its advance into the top ranks of American research universities, it must move faster than the others, for its peers are moving ahead, too.

Certainly the groundbreaking for the building must be followed soon by the launching of a major drive to raise the funds to pay off the debt.

I hope all College alumni will participate in this effort. The new building, and the brilliant work that will take place there, will add value to USC, add prestige to the USC degrees of its alumni and allow Los Angeles to take its rightful place at the forefront of global bioinformatics.

Jana Waring Greer
Chair of the Life Sciences Committee
USC College Board of Councilors
Hands-on Learning

Geobiology course on Catalina breaks new ground at the intersection of life and earth sciences

For the earth science students, it was the first time they had ever isolated bacteria or prepared DNA from a cell. For the biologists, it was the first time they analyzed rocks out in the field. For everyone, a new course in the nascent field of geobiology brought a summer full of firsts.

The six-week hands-on geobiology course, sponsored by the Agouron Institute of Pasadena, brought some 50 students, scientists and instructors to Catalina Island to explore and build the rapidly evolving field of geobiology — a synthesis of geology and biology that addresses the intersection of life and earth, air and water.

Hosted by the Wrigley Institute of Environmental Studies, the intensive, and often exhausting course, introduced graduate students (including five from USC), to current research and methods in geobiology through lecture, lab work, field studies and independent research.

Course planners also aimed to encourage collaborations among established scientists and to provide an opportunity for the development of a common geobiological language that transcends the lexicon of traditional disciplines.

“Geologists and biologists still do not entirely understand each other’s language, and so cannot fully appreciate each other’s research,” says Kurt Hanselmann, co-director of the course and an environmental microbiologist at the University of Zurich.

“This course was a first step in bridging the gap between disciplines.”

“This summer course broke new ground for the exciting, emerging field of geobiology, which we believe will become a major area of basic research,” says Mel Simon, a founder of the Agouron Institute who is also the Anne P. and Benjamin F. Biaggini Professor of Biological Sciences at Caltech. “We chose to run the program at USC because the academic and physical resources there are remarkably supportive of this new field.”

The non-profit Agouron Institute developed and supported the course through an initial gift of $700,000. Agouron will fund the course through the summer of 2004, after which USC will seek other sources of support.

Leading geobiologists were invited to instruct the course, with other top researchers participating in a series of one-day research symposia held over the summer. Students were admitted through a competitive process, and included nine from outside the U.S.

“The course brought together the most important players in the field today,” says Anthony Michaels, director of the Wrigley Institute and associate professor of biological sciences, who was key in organizing the course. “Beyond teaching, the course allowed these scientists to get to know each other and build a foundation for the field.”

According to a 2001 report from the National Research Council (NRC), geobiology is one of the most significant and promising areas for basic research in the earth sciences. The NRC report cited the potential impacts that geobiology could have on the understanding of the origins and evolution of life on earth, a main theme in the Agouron Course.

Geobiological studies also could reveal more about the history of the environment, climate change, biological controls of earth processes and the dynamics of the environment. In addition, geobiology has many potential applications in biomediation, biofilms and the search for life on Mars.

The field has grown in prominence as studies of the interactions between living things and the geochemical environment have led to the realization that the two are surprisingly interdependent. In recent years, geobiology has been energized by discoveries of unusual microorganisms living deep beneath the earth’s surface, the discovery of the important role of microbial communities in the global cycling of elements, and major advances in scientific instrumentation.

Up to now, few formal training opportunities have been available, so interested students studied traditional fields such as microbiology, biology, geology and geochronometry, or learned directly from mentors. USC College of Letters, Arts & Sciences faculty hope to change that: along with the summer course they are actively building a graduate program in geobiology. The program, which has already attracted graduate students and two shared research grants with the USC School of Engineering, will include 10 current faculty plus three more to be hired over the next two years.

“Hosting this course has been terrific for us,” says USC geochemist Will Berelson, associate professor of research in earth sciences, who co-directed the summer course.

USC’s Kenneth Nealon, who holds the Wrigley Chair in Environmental Sciences and Earth Sciences in the College, was involved in the early development of the course with Agouron and also served as an instructor.

Holding the course at the Catalina Island facility had a number of benefits: first, there were few distractions for students and instructors; and second, the island boasts diverse communities of microbes living in the nearby isthmus, buffalo drinking pond and the open ocean.

Each week saw a different set of instructors focus on an aspect of geobiology.

In the first week, instructors explored the chemistry of life, examining current thought, research and methods in the study of how non-living chemicals might have transformed into living molecules, such as the self-replicating nucleic acids.

Subsequent weeks dealt with the history and changing chemical environment of the planet through geological time, and the evolutionary history of microbes and their interaction with the changing environment in prehistoric times.

“We are watching a new field being born,” says Michaels. “It’s exciting stuff.”

— By Eva Emerson

Wrigley Gets Financial Boost from Boones

Three generations of Boone men cut the ribbon for construction of new faculty housing at the Wrigley Institute for Environmental Studies on Catalina Island during the Advisory Board Retreat last spring. George Boone, a USC Trustee and member of the College’s Board of Counselors and Wrigley Institute Advisory Board, celebrated the groundbreaking with his son, Nick Boone, and grandson, Adam Fetter. A gift from George and his wife, Mary Lou, provided money to build Boone House, the centerpiece of the new residential project to house visiting faculty. The buildings are designed to match the existing buildings at the Catalina facility. A new road, increased utilities and other infrastructure improvements are paving the way for further construction. Additional housing for faculty and graduate students attracts grant money and provides rent from non-USC researchers who will use the Institute for studies and sabbaticals. “The addition of the new housing will have a profound effect on the financial success of the Wrigley Institute laboratories,” says Anthony Michaels, associate professor of biology and director of the Wrigley Institute.
### Waterman’s Mark

He wrote the book on computational biology

When it comes to mixing math and biology, USC University Professor Michael S. Waterman wrote the book — figuratively through his early work that defined the multidisciplinary field of computational biology, and literally, when he published the first textbook on the subject in 1995.

The field, he writes in the book’s preface, “is not intended for those who like their subjects neatly fenced in and contained.”

That certainly does not describe Waterman, professor of biological sciences, mathematics and computer science, who has sought boundaries to cross and barriers to topple throughout his career.

In the process, he has helped build the mathematical foundations of modern molecular biology, which have grown increasingly important in the era of genome sequencing and the attendant exponential growth in biological data.

With the rising profile of the fields of computational biology and bioinformatics, recognition of Waterman’s contributions has increased apace. In 2000, he was elected to the National Academy of Sciences and, most recently, Waterman was chosen as one of eight scientists to receive the Gairdner Foundation International Award for his key role in the sequencing of the human genome. (See Gairdner Award, Page 17). During his training, first in mathematics at Oregon State and then Michigan State University, where he earned a Ph.D. in statistics, Waterman combined his interests in pure math with the applied math of statistics and probability.

“I guess I don’t see such sharp boundaries between pure and applied math,” says Waterman, who is the USC Associates Endowed Professor of Mathematics and Natural Sciences.

In the mid-1970s, Waterman crossed into another discipline at the prompting of Los Alamos National Lab chemist Stan Ulam, who suggested that someone should start looking at the new biology of genetics with an eye toward mathematics.

Waterman took Ulam’s bait, intrigued by the idea of how gene and protein sequences could shed light on evolution.

Waterman and colleague Temple Smith, now at Boston University, began work on an algorithm that would allow scientists to analyze the similarity of protein and gene sequences by searching for the optimal alignment between one stretch of DNA and another.

In 1961, the two published the Smith-Waterman (S-W) algorithm and a related computer software program. The S-W algorithm allowed...
scientists to search for clues to the function of a newly identified gene (or protein) by comparing its sequence to that of a previously studied gene. In addition, the algorithm served as a way to measure the degree of relatedness between sub-species, two strains of corn for example, or two species, such as humans and chimpanzees. “Smith-Waterman was Mike’s first major contribution to computational biology, as well as computational biology’s first major contribution to biology,” says Fengzhi Sun, associate professor of computational biology and math and a former student of Waterman’s. Waterman joined the USC faculty in 1982, and soon after developed the statistical theory and tools to test whether the match of two sequences was statistically significant, providing a reality check for biologists much like a student’s test or the relative risk calculations of medical science.

As biologists’ interest turned to the study of genomes, Waterman began collaborating with Eric Lander, a mathematician turned biologist at MIT and later a key leader of the federal Human Genome Project. In 1988, they published the Lander-Waterman formulas, which provided a roadmap for genome sequencing efforts using the so-called shot-gun strategy. The shot-gun approach involved cutting up the genome into short fragments of DNA, which were faster and easier to sequence, and then trying to fit them back together in the correct order and orientation, like pieces in a giant puzzle.

The formulas and other work by Waterman were crucial to the success of the public Human Genome Project and the effort by the private company Celera Genomics, which were locked into a heated competition to finish drafts of the genome. When Waterman first came to USC he began work on developing a cross-disciplinary program built on genetics, math, and information and computer sciences. The program was strengthened by the 1989 arrival of fellow computational biology pioneer Simon Tavaré, and Waterman’s close collaborations with the College’s stellar faculty in molecular biology and genetics. USC computational biology continues to grow, with the establishment of the Center for Computational and Experimental Genomics in 2001 and a new building slated to house the program first envisioned by Waterman two decades ago.

“Mike is always the first to realize the importance of a problem,” says Sun. “Most people just follow the ideas of others — they do the next step — but Mike creates ideas.” — E.E.

Understanding the extent and nature of variation in humans—or plants for that matter—is at the heart of the scientific investigations led by USC College geneticist Magnus Nordborg. “I focus on the genetic bases of adaptation,” says Nordborg, assistant professor of biological sciences and a key member of the Center for Computational and Experimental Genomics. Genetic variation, he explains, lies at the core of evolutionary adaptation. Adaptive traits— which stem from small variations in genes that are passed on to offspring— can help an organism to survive or reproduce. Tracking how adaptive, complex traits are inherited will provide scientists with the closest view yet of the actual mechanisms of evolution at work.

“Most individuals within a species are 99 percent alike genetically,” he says. But very small genetic variations are created by random mutations in DNA and through the shuffling of parental genetic material during the cell division that produces sperm and egg cells. These can give rise to the differences we recognize in each other—from fallen arches to freckles, propensity for diseases like diabetes or osteoporosis and even the complex personality traits that make us each an individual.

A Sweede with a finely developed sense of design—indeed nothing seems out of place in his well-scrubbed lab and IKEA-appointed office—Nordborg first came to the U.S. to attend graduate school at Stanford University. There he trained as a population geneticist, absorbing both classical genetics and cutting-edge mathematics and molecular biology. His thesis work brought him closer to bioinformatics, as he applied sophisticated math and computer tools to questions of population genetics.

That training has served him well at the College, where he works closely with computational biologists, combining the theoretical with the experimental in his own lab. “I’m very interested in doing things efficiently,” he says. “I care about questions, and when you’ve got a good question you go and do what you need to do to find the answer. I’m very mathematical for a biologist, but I am a biologist.”

As a post-doctoral fellow at the University of Chicago, Nordborg worked with plant geneticists studying the genetic roots of the variations seen in the mustard weed Arabidopsis thaliana, the most-studied model organism of plant gene researchers.

Nordborg works with the Chicago group to create a database of DNA sequence variation found in each of 96 strains of Arabidopsis. The team collected the strains of the plant from around the world, many of which have special adaptive traits, such as an early flowering time, an ability to grow in the cold or survive in drought-like conditions.

Nordborg’s lab has been busy searching the DNA sequences for genetic variations as small as a single misspelled DNA letter, called a single nucleotide polymorphism or SNP. The team will search for about 20,000 SNPs in all.

The project represents the first attempt to measure genetic variation across an entire genome, and tests a method that may one day be applied to many kinds of organisms. — E.E.
Aacked within the human brain are a trillion nerve cells—constantly communicating through a vast and intricate network that stretches across the body. Somehow, this buzz of activity creates consciousness, language, memory, vision, movement and more. At USC, understanding how the brain functions is a goal that unites a diverse group of basic scientists, engineers and clinical researchers active in the university-wide Neuroscience Graduate Program (NGP).

“An interdisciplinary approach is essential in neuroscience research and education,” says neurobiologist Larry W. Swanson, the Milo Don and Lucille Appleman Professor of Biological Sciences and director of the program, which is led by the College.

The sheer complexity of the brain demands such a broad approach. NGP draws upon the knowledge of more than 100 faculty members from biology, psychology, linguistics, computer science, biomedical engineering, neurology, psychiatry, pharmacy, gerontology and other disciplines found in USC College and in the schools of Engineering, Gerontology, Medicine and Pharmacy.

The research community is strengthened by the involvement of scientists from the Mann Institute for Biomedical Engineering, the Zilkha Neurogenetic Institute, the Center for Neural Engineering, the Doheny Eye Institute, Children’s Hospital Los Angeles and others.

“The Neuroscience Graduate Program is a good example of how interdisciplinary research can be successfully developed and sustained,” says USC President Steven B. Sample. (See the Q&A with Sample on Page 10).

Graduate training consists of a limited number of required courses and a heavy emphasis on student research. First-year students take part in a yearlong core course that introduces the many disciplines and approaches that make up the neurosciences.

Thanks to special funding from the Provost, first-year students receive fellowships that allow them to work in a variety of faculty labs from any of the member departments or schools. The next years are designed for students to begin focusing coursework and research on an area of interest, which will eventually lead to a thesis and a Ph.D.

In addition to educating the next generation of neuroscientists, the program has helped create a stimulating environment for the creation of new knowledge about the brain and has become the center of USC neuroscience efforts.

The graduate program, through its shared students, courses, seminars and regular activities, such as the weekly “neuro lunch,” helps to create an atmosphere for sharing ideas and approaches that make up the neurosciences.

How the brain creates behavior

Some behaviors — finding food to eat and water to drink — are crucial to survival. From the point of view of USC College neuroscientist Larry W. Swanson, who studies such basic drives as hunger and thirst, these behaviors provide critical insights into the brain.

Since the late 1960s, Swanson, the Milo Don and Lucille Appleman Professor of Biological Sciences, has investigated the biological basis of behaviors through studies of what are called motivated behaviors.

His studies led to the discovery and mapping of distinct neural circuits responsible for producing and controlling digestive (eating and drinking), sleep-wake, defensive and reproductive behaviors.

“These drives are separate but overlapping in the brain,” says Swanson, director of the USC Neuroscience Graduate Program. The behaviors may affect each other — for example, Swanson has shown that during sleep, food and water-seeking behaviors are effectively shut down.

The circuitry underlying these drives extends into many areas of the brain, allowing the complex behaviors to emerge. Like a simple reflex, motivated behaviors may be triggered by a stimulus (a pang of hunger), but the resulting response is much more complex.

The mapping of the neural pathways involved in the behaviors set the stage for studies of how the brain controls these behaviors. Swanson has focused on how stress and sexual hormones affect the neural networks underlying the drives.

Swanson is also well known for producing the first maps of the fine structures of the brain and for developing advanced computer graphic tools that have proved invaluable research resources for neuroscientists. — E.E.

• Learning and Memory. USC researchers have mapped neural networks involved in memory and simple learning, and study molecular and cellular mechanisms.

• Behavior. Investigators focus on the biological basis of behaviors, studying basic drives and the roots of aggression and violence.

• Systems. USC scientists have made a mark showing how the parts of the brain act in a series or in unison to produce complex behaviors.

• Aging. Researchers look at the effects of aging on the brain and nervous system, have helped define normal aging of the brain.

• Clinical Neuroscience. USC scientists and clinicians study and search for treatments for debilitating diseases of the brain and nervous system, including Alzheimer’s and depression.

• Technology and Neurosciences. Faculty are at work on a neural prosthesis, or brain chip, and new brain imaging tools. Computational neuroscientists study the intersection of the brain and computers. With the support of the university, Swanson is leading efforts to enhance the stature of the graduate program, with an ultimate goal of USC becoming one of the top programs in the nation. To do this, he plans on more research space, additional state-of-the-art equipment and substantial growth in faculty.

Yet most important, Swanson says, will be the continued support of scientific collaborations that cross discipline, school and campus. — E.E.
A Master of Mutations

Goodman investigates origins of genetic change

In the world of biology, mutations — changes in the genetic material of a living cell — can kill. In response, living things, from bacteria to human cells, have evolved extensive cellular machinery to guard the integrity of their genomes.

That has made the discovery of how cells actively introduce mutations in DNA all the more surprising, says USC molecular biologist Myron F. Goodman, who investigates the bio-chemical origins of gene mutations.

“Overwhelmingly, DNA mutations are bad for cells,” says Goodman, professor of biological sciences and chemistry at USC College. “Yet, in some situations, there are advantages of having a system that introduces mutations.”

Recent research by Goodman suggests how the risks of genetic change are balanced by its potential benefits.

In a study published in the June 11 Proceedings of National Academy of Sciences (PNAS), Goodman and Steve Finkel, assistant professor of molecular biology, show bacteria with genes associated with mutation can out-compete bacteria lacking the genes.

“The exciting thing is that the cell requires this system for fitness, that the genes provide a selective advantage,” Goodman says. “Remarkably, they seem to be there to deliberately introduce mutations.”

Mutations, the reasoning goes, introduce genetic diversity within a population of bacteria, allowing for rapid adaptation. In bacteria, one cell with an advantageous mutation can quickly repopulate the entire colony.

Chief of the division of molecular and computational biology in the biology department, Goodman has long studied the molecular systems that read and copy DNA in the bacteria E. coli. In the process, he has made fundamental contributions to the understanding of both normal and aberrant DNA replication and repair, and the origins of genetic change.

His discoveries have provided insight into a host of biological processes ranging from cell mutation to evolution, as well as clinical problems including genetic diseases, aging and cancer.

Goodman began his career in electrical engineering, earning a Ph.D. from Johns Hopkins University in 1968. Goodman’s graduate work in “theoretical quantum electronics” gradually drifted toward biology. His thesis looked at laser interactions with biological molecules. That led to a five-year fellowship in the biochemistry lab of Maurice Bessman at Johns Hopkins and, in 1973, to a job offer from USC.

“I’ve never regretted turning my focus to biology,” he says.

Goodman first received widespread recognition when he developed the technique used to measure the accuracy of the enzymes that copy DNA, revealing the incredible fidelity of DNA replication under normal conditions.

Mistakes that could lead to mutation occur rarely, he showed, at a rate of one in 10,000 to 1,000,000 DNA bases incorporated into a new strand. The assay he developed remains widely used today.

Goodman’s search for the molecular roots of mutation next led him to look at what happens in cells damaged by ultraviolet light.

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Chief of the division of molecular and computational biology in the biology department, Goodman has long studied the molecular systems that read and copy DNA in the bacteria E. coli. In the process, he has made fundamental contributions to the understanding of both normal and aberrant DNA replication and repair, and the origins of genetic change.

His discoveries have provided insight into a host of biological processes ranging from cell mutation to evolution, as well as clinical problems including genetic diseases, aging and cancer.

Goodman began his career in electrical engineering, earning a Ph.D. from Johns Hopkins University in 1968. Goodman’s graduate work in “theoretical quantum electronics” gradually drifted toward biology. His thesis looked at laser interactions with biological molecules. That led to a five-year fellowship in the biochemistry lab of Maurice Bessman at Johns Hopkins and, in 1973, to a job offer from USC.

“I’ve never regretted turning my focus to biology,” he says.

Goodman first received widespread recognition when he developed the technique used to measure the accuracy of the enzymes that copy DNA, revealing the incredible fidelity of DNA replication under normal conditions.

Mistakes that could lead to mutation occur rarely, he showed, at a rate of one in 10,000 to 1,000,000 DNA bases incorporated into a new strand. The assay he developed remains widely used today.

Goodman’s search for the molecular roots of mutation next led him to look at what happens in cells damaged by ultraviolet light.

Since the early 20th century, scientists had known that X-ray and ultraviolet light can induce gene mutations, the reasoning of both normal and aberrant DNA replication.
...continued from page 7

Goodman and Finkel’s work sug-
gests an advantage to cells of the
sloppy copying of the pol V enzyme —
itis appears to help bacterial cells
adapt in unfavorable conditions. In
other papers published this sum-
mer, Goodman’s team has revealed
more about the biochemistry of
pol V, including the details of how
a common cell protein, Rec A, facili-
tates the process.

Goodman, who currently leads
four grant-funded projects, also
studies “programmed mutation” in
the human immune system. Low-
fi delity human enzymes similar to
pol V appear to copy DNA in anti-
body-producing B cells, resulting
in the generation of the diverse anti-
body clones needed to fend off attacks
from an enormous variety of disease-
caus ing agents.

In human genetics, Goodman and
John Petrovka, professor of biology,
investigate the DNA polymerase-
based mechanisms involved in the
expansion of repeated three-letter sec-
tions of DNA, called trinucleotide
repeats, a motif shown to cause many
serious neurological diseases including
Huntington’s and Fragile X Syndrome.

In 2000, Goodman received a pre-
igious MERIT award from the
National Institutes of Health (NIH).
MERIT (Method to Extend Research
in Time) awards are bestowed on
fewer than 5 percent of all NIH grantees
each year. All told, the 10-year
grant provides more than $2 million in
research funding for Goodman’s lab.
Among many other awards, he also
has been honored with the 2001 USC
Associates Award for Creativity in
Research and Scholarship.

“Myron Goodman’s work on this
new class of enzymes represents a
major breakthrough in our fundamen-
tal knowledge of biology,” says
Joseph Assm, dean of the College.
“It also suggests possible applica-
tions in clinical medicine and gives us a
new appreciation of how living things
g et the raw materials needed for evol-
utionary change.”

—E.E.

Learning to Remember
Thompson maps the path of memory

In a career spanning 45 years, USC
College neuroscientist Richard F.
Thompson, Keck Professor of
Psychology and Biological Sciences,
has pursued the question of how we
learn and remember.

Using a wide variety of approaches —
from psychological to genetic —
Thompson has tracked the minute
physical changes that take place in
the brain as learning occurs and mem-
ories are coded, stored and retrieved.

Thompson’s studies have led to
many important discoveries. Capping
off years of hard work, in 2002
Thompson became the first to identi-
fy and map the neural circuits respon-
sible for classical conditioning.

Classical conditioning involves
forming a basic association between
two events, such as when Ivan Pavlov
trained dogs to associate the sound of a
bell with dinner. When the bell
rang, the dogs salivated in expecta-
tion of food.

“We think that most learning
involves the brain associating one
type of event with another, and this
association also relies on memory,”
says Thompson.

Impacts of Thompson’s insights
into classical conditioning are broad,
as this model of simple learning
informs research on all types of learn-
ing, including the very complex.

“It’s the fundamental building
block of learning,” says Larry W.
Swanson, USC professor of biology.

Much-lauded, Thompson is a
member of the National Academy of
Sciences, the American Academy of
Arts and Sciences and the American
Philosophical Society — three of the
top honors an American scientist can
receive.

“He is one of the most distin-
guished scientists at the university,”
says Swanson.

—E.E.

Collaborations define life sciences network

USC College life scientists cross the boundaries of discipline, department and even cam-
pus in their search for answers.

Take Leonard Adleman, the Salvatori Professor of Computer Science and professor of
molecular biology, whose team invented the DNA computer, showing how a living system
could serve as a computational medium. Or there’s chem-
istry professor Arieh Warshel, a leader in the study of bio-
logical enzymes. Adleman and Warshel, both key mem-
bers of the College molecular biology group, help link life
scientists in biology with computer scientists and chemists.

Similarly, researchers in the departments of psy-
chology, anthropology, linguistics, physics, kinesiology,
et earth science and others represent a critical part of the
College’s life sciences network.

Farther afield, College Life scientists’ efforts are com-
plemented by the work of basic and biomedical investigators at USC professional schools and at
partner institutions such as the USC/Norris Cancer Center and Children’s Hospital Los Angeles.

In collaboration with Keck School epidemiologist Robert Haile, biologist Jed Fuhrman,
McCullough-Crosby Chair of Marine Biology, is developing new ways to measure the
counts of disease-causing viruses such as hepatitis in seawater near storm drains on
Southern California beaches. Earlier findings by Haile, professor of preventive medicine,
suggested the need for a new method: L.A. swimmers risk developing respiratory, gastro-
intestinal and skin ailments when beaches are rated safe by traditional measures.

Life scientists at the School of Engineering blend life sciences with technology
research, creating robots with artificial vision and intelligence and exploring the use of
silicon chips in the brain. —E.E.

Business Office Moves

The USC College business office has moved to a new location. The office is now in Room
130, in the east wing of the Physical Education building — located between Cromwell
Field and the Bovard Administration building. The move allows many of the College’s
business functions to take place at a central location, making it more convenient for fac-
ulty, staff and students to perform business-related tasks such as submitting payroll forms
and business expenses. All business office telephone numbers remain the same, how-
ever the office’s new mail code is 0656. The business office is open from 8:30 a.m. to
5 p.m., Monday through Friday.

Life Sciences: Collaboration and Innovation

Goodman...
A Simple Theory

Beauty is in the ping of the pleasure cells

Beauty is in the eye of the beholder," goes the old cliché. Poetic, to be sure, but hardly exacting enough for neuroscientists.

USC psychology and computer science professor Irving Biederman might rephrase it: "The pleasure of perceptual novelty and richness is in the opiate receptors of the cerebral cortex."

Biederman’s new theory might go a long way toward explaining how we cast our attention on our surroundings and why we find one thing more "interesting" at first blush than another.

"The deep question here," says Biederman, who is the Harold W. Dornsife Professor of Neuroscience in the College, "is how to account for our motivation when we’re not worried about our immediate survival or focusing on a specific search task, like hunting for our car keys. This is about 95 to 99 percent of the time for most human beings.”

Biederman proposes a simple mechanism by which the brain seeks to "maximize the rate at which it acquires new but interpretable information."

His idea rests on the observation that in the cerebral cortex – the brain’s voluminous outer envelope where our “higest” levels of cognition are based - enkephalin-releasing cells are distributed in a gradient. (Enkephalins are one of the brain’s own natural opiates, the neurochemical basis of pleasure.)

These “pleasure cells,” to coin a phrase, are sparse in the primary sensory areas where very basic perceptual information such as lines, edges and simple tones are processed.

The pleasure cells grow more numerous as information proceeds through higher processing levels, where we experience things like shape, pattern and texture.

They are densest in the so-called association areas, where complex and meaningful things like faces, objects, voices and melodies are represented, and where our perceptions get associated with past experience.

Biederman’s idea is that the more pleasure cells that are activated at once, the more subconscious, attention-grabbing pings of pleasure we get. And because these pleasure cells are densest in the association areas, our attention is automatically biased toward complex perceptions that have the most meaning.

“One thing this theory has going for it is that it’s so simple,” Biederman says. "In cognitive neuroscience we keep finding dumb mechanisms doing smart things. And here’s a really dumb mechanism: Your preference for some experience is related to the amount of activity that’s created in certain brain areas. It keeps us efficiently attuned to the world in a way that feels really intelligent, yet it’s so simple.”

Biederman says this theory also explains our taste for novelty and why conversely, familiarity breeds contempt. It rests on an additional principle of brain organization called "competitive learning" - the fact that as the cortex gets more familiar with something, it uses fewer cells to “encode,” or represent it.

Something novel activates large swaths of the cortex, firing lots of pleasure cells and making a strong bid for our awareness. But as we experience the thing more, fewer cells are devoted to representing it. This results in fewer pleasure cells firing and a consequent lessening of its tug on our consciousness.

Beauty is in the ping of the pleasure cells

Researching Ways to a Better Old Age

Gatz says the study of older adults needs more diversity

Margaret Gatz knows that not all the elderly are white and middle class. Just the ones we hear the most about. What the field of aging needs, she says, is a dose of reality.

“We need more people of color in the aging field,” says the professor of psychology whose primary area of expertise is the mental health of older adults.

“In the next 20 years, the level of diversity in the elderly population is going to explode,” says Gatz, former associate editor of the journal Psychology and Aging.

“There is a need to develop culturally appropriate tools,” says Gatz, who has been at USC since 1979, working closely with the elderly population in multi-ethnic Los Angeles.

For instance, Japanese Americans who lived through internment camps will have different needs from Jews who emigrated from Eastern Europe.

Gatz, who recently received a two-year Zenith award for research from the Alzheimer’s Association, became interested in aging as a postdoctoral fellow at Duke University in the early 1970s.

“I saw there was a need to understand how to preserve a sense of well-being throughout life,” she says.

To this end, Gatz has devoted her studies to answering the question: What is successful aging from a psychological perspective?

A large part of Gatz’s research involves studying the causes and preventative strategies of Alzheimer’s disease and other forms of dementia.

Since 1985 she has been working with the Swedish twin registry — one of the largest in the world — to find clues as to what causes dementia.

Over the last 15 years, Gatz’s team has studied 300 pairs of twins reared apart. By comparing this group with a smaller control group of twins raised in the same family, her team looked at concordance rates for Alzheimer’s.

In both groups, Gatz showed that if one twin has Alzheimer’s, the twin partner’s chance of getting some kind of dementia increased more than 50 percent.

“It suggests a strong genetic component to the disease,” she says. “But environmental factors play a role too.”

For instance, the diseases sometimes struck the twins at different ages.

From that research, Gatz began studying lifestyle habits that might correlate with a later onset of disease.

Some previous studies have shown that mental activity might help delay dementia — the “use it or lose it” theory.

Gatz’s data supports this idea, but suggests that, like findings about exercise, a higher mental activity over the lifespan is crucial.

“If you sit down at 50 and start doing crossword puzzles like crazy, I don’t think that would have much influence on dementia,” says Gatz, who supervises students who see patients at the Huntington’s Hindsgaul Older Adult Counseling Center.

Mental health of older adults is sometimes the focus of Gatz’s research. Her other interests include earthquake preparedness and sports.

But the well being of the elderly remains her primary focus.

“At some point dementia affects us all — a family member, a friend or ourselves — and we will all be elderly if we live long enough.”

— Matthew Bleskeske, USC News
I am delighted to be here to address the Board of Councilors of the College of Letters, Arts and Sciences. I want to thank you for all of your time and effort on behalf of USC. The College of Letters, Arts and Sciences has made tremendous strides in recent years, and we would not have been able to do it without you. Dean Aoun, our senior administrators, and I value your guidance and dedication. We’re fortunate to have such a distinguished group of people as councilors for the College.

It’s wonderful being here in the Loker Institute. I want to take a moment to recognize two people who have done so much for USC. In fact this building and this library are named for these two individuals. Katherine Loker is with us here today. Katherine Loker and her husband, Don, were first approached in the 1970s about supporting hydrocarbon research here at USC. They were told that there was this wonderful chemist – a person of great promise – whom USC wanted to recruit to the faculty. Katherine and Don Loker gave the initial funds to bring George Olah here. He went on to win the undivided Nobel Prize in chemistry in 1994. This is an excellent example of the marvelous synergy that can result between a great scientist and a great donor.

The Loker Hydrocarbon Institute is celebrating its 25th anniversary in March. It is now the premier hydrocarbon institute in the world. I want to congratulate both George Olah and Katherine Loker on this milestone.

For the next few minutes, I’d like to talk about the future of USC and the direction of the university in the years ahead. I want to stress two points, and I cannot emphasize enough how important they are to the mission and the future of USC. The first point is the enormous importance of the College of Letters, Arts and Sciences to the mission of the university. The second point is the tremendous importance of USC’s initiative in the life sciences and the role of the College in pursuing this initiative.

At practically every great university, the College is at the very center of the institution. The College plays an integrating role in the intellectual life of our academic community. All undergraduates at USC take courses in the College, whether they are majoring in English, business, cinema, public administration, or something else. Indeed, the College generates more undergraduate credit hours than all of the other units of the university combined.

In order for USC to maintain and improve its stature as one of the leading research universities in the country, we need to continue to advance the quality and reputation of the College. It is the College that must continue to take the lead in carrying out our central academic mission. College faculty have led the way in the development of USC’s new core curriculum, and College faculty have led the way in the development of our unrivalled array of minors. The notion of “breadth with depth” and our Renaissance Scholar Program (innovations in undergraduate education which I find very exciting) were initiated and brought to fruition by the College.

There’s a powerful halo effect which benefits a university’s professional schools when the College at that university is exceptionally strong. Let me illustrate. Some years back a researcher conducting a poll asked people to name the top 10 law schools in the country. Princeton’s law school consistently made it into the top 10. But Princeton doesn’t have a law school. Princeton does, however, have a superb college of arts and sciences. Which simply illustrates the fact that the overall reputation of any university is driven to a large extent by the reputation of its college.

Our goal for the College at USC is to be as dramatic as the development of relativity theory and quantum mechanics in the first half of the 20th century. Funding for research in the life sciences from both public and private sources is soaring. Wall Street is pouring money into life science research – the amount of money invested in the U.S. biotechnology industry increased 156 percent in one year, growing from $138 billion in 1999 to $354 billion in 2000. The federal government is also pouring money into research in the life sciences. If Congress passes the 2003 budget proposed by President Bush, funding for the National Institutes of Health will have more than doubled over the past five years. This is an opportunity we cannot afford to miss. If we want to compete as a university, we must increase our share of federal support in the life sciences.

There is another reason why the life sciences are so vital to USC. That reason has to do with our location. California is the world center of biomedical technology; and Southern California, not Northern California, is the center of the biomedical industry in this state. There are more researchers and more companies here, and more money is being spent on biomedical research in this region, than in Northern California. UCLA and UC Irvine may be our competitors in some ways, but they are also our allies in the competition between Southern California and the rest of the world. The huge investment that Caltech is making in the life sciences works to the benefit of all of us in Southern California. Our location offers us a unique opportunity to build on the strengths of our region.

Because of the importance of the life sciences, we have made them a top priority. The College is central to this effort.

We’re very fortunate to have Joseph Aoun at the helm. Dean Aoun is serious about meeting this challenge, and he will rely on your counsel to help him achieve this goal.

Now I want to turn our focus to the other important area we must address – the life sciences. The life sciences will probably be the single hottest area of research in the first half of the 21st century. Developments in the life sciences over the next few decades could be as dramatic as the development of relativity theory and quantum mechanics in the first half of the 20th century.

This Q&A with President Sample and the USC College Board of Councilors was held last February.

Ken Ambrose: I would like to address some of the lower priority projects. Can undergraduate housing compete for dollars?

Sample: I think our new International Residential College, which just opened last month and which accommodates 400 students, is a meaningful response to that question. It’s as good as anything in the United States.

Ken Ambrose: Could we build more? Yes. Would there be an income stream to help pay for additional housing? Yes. Would I move another housing project ahead of facilities for the life sciences? No. Our rehabilitation funds have increased significantly, from $6 million to $21 million per year. Housing receives the biggest allocation of rehab dollars. We have rehabilitated hundreds of dormitory rooms in recent years. The quality of this rehabilitated space is very good. There is also heavy pressure to provide housing for graduate students. A private development firm has proposed building a 32-story high-rise dormitory, which seems to be a promising option.

Robert Dockson: You wrote a very interesting letter to our governor. Can you talk about that?

Sample: At a meeting with Governor Davis, attended by a trustee, the governor noted that California has nine great public research universities (by which he meant the nine campuses of the University of California) and two great private research universities, Stanford and Caltech. He also allegedly said that USC is starting to become a research university. I wrote a letter to the governor in which I...
pointed out that some of his staff members might be grossly miscon- 
formed about USC’s status as a 
research university. I noted that in 
terms of federal research dollars, USC 
ranks fifth among the nine research 
universities in the state, ahead of 
Berkeley and Caltech, and ranks in the 
Top 10 of all private research uni-
versities in the country, ahead of such 
competitors as Princeton, Duke, 
Northwestern, Chicago and New 
York University. I also pointed out 
that in terms of Ph.D. degrees award-
ed annually, USC ranks fourth in the 
state. I also noted that USC had 
been recognized as a leading research 
university more than 30 years ago 
by its election in 1969 to the presti-
gious Association of American Universities, 
well in advance of all but three other institutions in the state. 
Greg Brakovich: It seems that the 
incoming freshman class is shrinking 
in size despite a rising applicant pool. 
Can you address this concern?
Sample: It’s not shrinking. It has 
remained pretty consistent at just 
about 2,800 freshmen for the past 
four years. 
Brakovich: We have moved from 
being a city college to a situation 
where 50 percent of our students are 
coming from outside of California. 
The B+ students from California are 
not gaining admission. I’m concerned that we’re moving away from our 
roots.
Sample: We were all traumatized in 
1991. The California economy 
slumped, and we were facing the pos-
sibility of a major deficit. USC was 
forced to implement massive layoffs 
and we eliminated 800 jobs – some-
things that hardly ever happens in higher education, and had never hap-
pened before in USC’s history.
After that we became much more selective in our admissions, in part to build up what’s known as “reserve demand.” We believed, correctly as it hap-
pened, that highly selective private universities would be relatively well-
protected against major economic downturns.
We also decided to diversify rather than remain too dependent on the 
Southern California economy. In terms of diversity, we now have a 
lot of different colors and ethnicities in our freshman class. But diversity also 
means recruiting students from differ-
ten areas of the country and the world. This kind of geographic diversity improves the education we can offer our Southern California students, who still constitute by far the largest group in our undergraduate program. Moreover, many of the out-
standing students we recruit from outside this area decide to stay here and become Southern Californians in their own right.
At first we were afraid of exclud-
ing the children and grandchildren of our alumni if we cranked up our aca-
demic standards. Before this tighten-
ing of standards occurred, 10 percent of our freshman class were legacies. After standards were increased, the proportion of legacies actually went up to 20 percent. As it turned out, many of our alumni weren’t letting their children apply to USC, because these alums felt we weren’t a suffi-
ciently strong and competitive uni-
versity. It is crucial, in my opin-
ton, that everyone is plugged in. It is 
likelihood important for us to have a 
unique identity as a College.”

The new communications strategy 
was developed by Alfred G. Kildow, 
who serves as a senior advisor to 
Dean Aoun and to Senior Vice 
President for University Relations 
Martha Harris. Kildow also has a 
senior role in developing a strategy 
for central communications in USC’s 
life sciences, under the leadership of Provost Lloyd Armstrong.

About This Magazine: 
Why feature 
life sciences?

This redesigned and rejuvenated 
College Magazine is the flagship for a 
convoy of improved and height-
ened communications devices and 
techniques aimed at connecting 
everyone in the community of USC 
College, according to Joseph Aoun, dean of the College.

On this issue’s cover is another 
important vessel, the redesigned 
graphic identity for the College.

Over the horizon is a new Web 
site for the College, one that will par-
allel the new Web site for USC that was 
unveiled before the start of fall semester.

Other communications advances 
planned by Aoun include regular for-
mal electronic communications with 
faculty, department chairs and stu-
dents, as well as special communica-
tions on issues for these groups and 
for members of USC College’s boards 
of advisors.

“The importance of a comprehen-
sive flow of timely, accurate informa-
tion to all members of the College 
community cannot be overstated,” 
says Aoun. “It is crucial, in my opin-
ton, that everyone is plugged in. It is likewise important for us to have a unique identity as a College.”

The new communications strategy 
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Dean Aoun and to Senior Vice 
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senior role in developing a strategy 
for central communications in USC’s 
life sciences, under the leadership of Provost Lloyd Armstrong.

Please write to us at collegemag 
@usc.edu or by mail at ADM 310. 
We’d like to hear from you.
High-tech lab key to interdisciplinary science study

USC is the new home to an illustrious trio of computational scientists.

The distinguished team – Rajiv Kalia, Aiichiro Nakano and Priya Vashishta – are known for establishing one of the premier computational science laboratories in the world. With nearly 40 years of combined experience in computer science, physics and material science, the three have joined USC as part of a collaborative effort between USC College of Letters, Arts & Sciences and USC School of Engineering.

“Anyone who cares about science at USC has to be excited about these appointments,” says C.L. “Max” Nikias, dean of the School of Engineering. “Vashishta, Nakano and Kalia head up one of the world’s leading research groups in advanced computational simulations. Such simulations are key to the interdisciplinary scientific focus of USC’s strategic plan.”

Joseph Aoun, dean of USC College, says the team’s “specialty cuts across all disciplines” and will allow USC to conduct simulations of highly complex systems, ranging from earthquakes to computational biology.

“Having them here enhances USC’s ability to attract and train undergraduates, graduate students and postdoctoral fellows in important emerging fields,” he adds.

The group brings its multidisciplinary research conducted at Louisiana State University, which includes large-scale computer simulations of novel materials and biomedical systems, procedures and techniques for the interaction of worldwide supercomputer networks, and software tools for interactive visualization environments.

“Any specialty on its own is always a great endeavor,” says Vashishta. “But when you group multiple specialties, you become unique. This is our strength.”

Among its many accomplishments, the team has developed unique computer software that allows the visualization of billions of atoms of material at one time. These large-scale simulations produce results that cannot be observed in a real-world environment or with the naked eye for various reasons, including the high speed of certain chemical reactions.

Aluminum, for instance, is a stable and strong metal used to create the frames of airliners. However, in smaller, powdery particles, aluminum becomes explosive. While the variability of such material in different states can be useful (the military uses powder aluminum to ignite rocket fuel, for example) the dynamics of such a reactive metal may be difficult to grasp in a lab. The group’s computer simulations help overcome this problem.

“T o learn the microscopic properties of many things, from materials to devices to biological systems, you need simulations of billions of atoms,” says Nakano. “The principles involved in our work can be applied to everything because all things are composed of atoms. This technology and research will help in the advancement of science.”

The computing systems used by the researchers are referred to as “supercomputers.” Currently, the world’s fastest computers can perform at the teraflop level, or 1,000,000,000,000 (trillion) mathematical operations per second. The group, incorporating its expertise in computer science, physics and material science, is working toward developing computer simulation software that is 1,000 times faster, performing 1,000,000,000,000,000 (quadrillion) mathematical operations per second, at the exaflop level.

This unprecedented computing power would enable researchers to carry out realistic simulations of complex systems in the areas of materials, nanotechnology and bioengineering. Among other things, it would provide scientists with the means to develop microscopic devices for highly sensitive biological sensors and study the impact damage of structural materials, as well as those used in turbine engines and armor, under extreme temperature and corrosive conditions.

The collaborative efforts of this multifaceted trio date back to the 1980s, when they worked together at Argonne National Laboratory, one of the U.S. government’s oldest and largest science and engineering research laboratories.

In 1990 they moved to LSU and shortly thereafter established the university’s renowned Concurrent Computing Laboratory for Materials Simulations. The group also played instrumental roles in creating LSU’s Biological Computation and Visualization Center.

Twelve years later and nearly 2,000 miles across the country, the group has found its new home in the City of Angels at USC.

“The group’s presence on campus will immediately put USC and its physics and engineering programs on the map in terms of high-performance computational science,” says Tu-Nan Chang, chairman of USC’s physics and astronomy program.

“I am really excited,” says Nakano, a native of Japan. “I look forward to collaborating with many USC experts in many different fields such as information sciences, integrated media systems and biomedical engineering.”

Along for the journey will also be the group’s spouses, children, seven postdoctoral associates, 10 postdoctoral researchers, a systems manager and their own 166-node supercomputer. They will work closely with the USC Center for High Performance Computing and Communications (CHPCC), which has a 320-node supercomputer.

When not collaborating on research, each member of the group will teach at the graduate-level. Kalia will teach physics; Nakano, computer science; and Vashishta, materials science.

By Gia Scalfiti, USC News

The trio’s unique software allows the visualization of billions of atoms of material at one time, shown here. Their goal: to make ceramic materials stronger and electronic devices faster.
New Life from New Funding

NSF helping make USC epicenter of quake research

Tom Jordan, SCEC’s director, announces new NSF funding for the center. Visit the new SCEC website at: http://www.scec.org/.

Along before the Southern California Earthquake Center’s funding was to run dry in January, Tom Jordan decided he wouldn’t let the project die. “We were faced with the prospect of this going away … and I thought that was completely implausible,” says Jordan, the center’s director and the W.M. Keck Foundation Professor of Earth Sciences in USC College. “We decided that there was such a need for continuing the work that the center was doing that we put together a new proposal.”

The center now has a new wave of funding, more members and a renovated facility in North Science Hall. The Southern California Earthquake Center will get $3.6 million per year from the National Science Foundation and the U.S. Geological Survey for the next five years. The center has also come out from under the wing of the NSF’s Science and Technology Centers Program, Jordan says.

Aside from the base grant, there will also be $2 million per year from the NSF’s Information Technology Research Program and $325,000 per year for the development of a digital library that will be used to organize, classify and retrieve information about temblors. While the center initially had nine core institutions – eight academic institutions and the Pasadena office of the USGS – that number expanded with the addition of Stanford, Harvard, MIT and three more USGS offices. There are also 25 participating institutions that don’t contribute resources, but have scientists who are active in the research.

Joseph Aoun, dean of USC College, says SCEC is also attracting top academic talent. “This is the kind of leadership we expected to gain when we successfully recruited Tom Jordan from his senior position at MIT,” Aoun says. “He is galvanizing financial support for this very important center, and he is attracting excellent young faculty and graduate students to join him.”

“This new round of funding, and the newly renovated quarters in Science Hall are tangible signs that USC is now the principal center for earthquake research in the world,” he adds.

SCEC’s growth has not been quick or easy, says Jordan. “It has taken years to come together as an earthquake community,” he says. “We know how to do things together that we, as individual scientists, can’t do alone. It takes a village, so to speak, to make these things happen.”

Interest in the center has grown since it was started 11 years ago because Southern California is a natural laboratory for studying earthquakes, he says. “Los Angeles really has one of the highest earthquake hazards of any major city in the world,” says Jordan. “Trying to get at what’s going on with earthquakes is very difficult. But here we have an opportunity to really get up close and personal with them.”

– By Usha Sutliff, USC News

In order to support dynamic research of the highest quality, USC College will now consider faculty requests for assistance preparing federally funded research proposals. The goal of this new effort is to assist principal investigators (PI) early in the writing process for proposals that require significant time and effort.

“The College is committed to supporting our faculty, so we can remain at the forefront of critical and current research. Research plays a vital role in making USC College such a stimulating community and we want to support our researchers in every way possible,” says USC College Dean of Research Donal T. Manahan.

Examples where assistance may be granted include the coordination of multi-PI grant applications for large center-type proposals, or the need for funds to host a series of workshops in which PIs, including those from other universities, convene to exchange information and work on proposal preparation. Requests from individual PIs also will be considered. However funding to obtain preliminary results for future proposals will not be considered.

The requests – up to $10,000 maximum – should be submitted to the Dean of Research at least two months before the agency deadline. They should consist of a one-page narrative justifying the request, the budget of the main proposal, any new space or facilities needs, a list of the participants and CVs – two-pages maximum – for each of the PIs. The amount of the request should be commensurate with the size of the effort (multi-PI versus single PI). If approved, the faculty participants, budget – including cost sharing – and space requirements will be established within a month of submitting the request.

College Offers Help with Proposals

A group of USC molecular biologists, mathematicians and computer scientists are undertaking an ambitious study of the genetic basis of evolutionary adaptation, thanks to a three-year, $2 million grant from the W. M. Keck Foundation. Most of the effort is taking place in USC College.

The interdisciplinary work seeks to fill in several critical missing links, including the genetic key to the evolution of Homo sapiens.

In a suite of four projects, the researchers are examining gene expression, mutation patterns and heredity in bacteria, plants, oysters and humans. Their goal is to home in on the genetic fundamentals that underlie how complex traits evolve – such as a plant’s tolerance for drought or the growth patterns of a primate’s forebrain.

Project One focuses on evolution in bacteria.

Project Two uses a powerful gene-mapping technique called linkage-disequilibrium to seek the genes responsible for adaptation in plants.

Project Three studies oysters to explain why offspring of individuals from inbred populations are frequently more fit than their parents.

And Project Four sets its sights on identifying the genes that turned Homo erectus into modern humans over the last million years.

Researchers from USC College include: Norman Arnheim, Steven E. Finkel, Myron F. Goodman, Donal Manahan, Magnus Nordborg, Simon Tavaré, and Michael S. Waterman.

$2 Million from Keck Foundation Aids Search for Missing Link

Missing Link Aids Search for $2 Million from Keck Foundation
Purvis Named Truman Scholar
Her dream is to attend Harvard, open a feminist law center

Dara Purvis, now a senior majoring in theater and political science with a 4.0 GPA, is the latest USC College student to be named a Truman Scholar, which recognizes public service as well as academic achievement. The 77 winners nationwide each received $30,000 for graduate studies.

Purvis is a founding member of the Feminist Majority Leadership Alliance at USC, which has sponsored campus appearances by speakers such as Mavis Leno and Katherine Spillar. She is chairperson of the Academic Culture Initiative Student Advisory Board and active in USC College Democrats and the Women’s Student Assembly.

“My parents raised my sisters and me to be very socially conscious,” she says. “They raised us to be aware of the problems in the world, and that we have a real obligation to try to make things better for other people.”

Purvis’ father teaches constitutional law at a college near Fresno, and her mother began practicing law three years ago after returning to school for her degree. Purvis grew up in Fresno, where she was a member of her public high school’s award-winning Academic Decathlon team.

She expects to use the Truman Scholarship for Harvard Law School, her first choice because of its strength in public interest law. Eventually, Purvis said, she would like to find a feminist law clinic that would harness the resources of a law school’s students and faculty to pursue legal and policy goals through the courts in such areas as abortion rights, health-care discrimination and the gender wage gap.

Purvis is president of the Feminist Majority Leadership Alliance.

“Hopefully, we’ll take over the campus,” she says with a wry smile. Although she finds that some of her fellow students are hostile to the women’s movement and that even many supporters shy away from the word “feminist,” the organization has grown steadily and accomplished a great deal, she said. She wants the organization to continue working with other student groups on campus to “build more of an activist community at USC.”

Purvis was also a columnist for the Daily Trojan during the past school year, writing regularly on such topics as media bias and the importance of unfettered speech post-Sept. 11. She has taken up fencing with the USC Fencing Club, and she works several hours a week as an SAT tutor at two South-Central Los Angeles public high schools.

If it sounds like Purvis is an over-achieving drone, think again. For a freshman project, she designed a witty Web page about herself, her family and her friends, complete with stick drawings to illustrate their personalities. A 1999 Fresno Bee article about her high school Academic Decathlon team lead with a description of Purvis as a “zany spirit into free expression … fun and brains.”

At that point, Purvis hoped to be an actress. Now, although she still enjoys theater, she says “There is something about politics and the law that really pulls me.”

Purvis has taken several political science classes from associate professor Howard Gillman, who suspended the usual syllabus for his Law, Politics and Public Policy class in 2000 to track the legal and political maneuverings surrounding the Bush-Gore contest. (Gillman wrote a book about the election as well.) She considers Gillman and Mark Kann, political science professor and director of the Academic Culture Initiative, as her mentors at USC.

“Dara brings a sense of urgency to her studies,” Gillman says. “She understands that a serious engagement with vital political, legal, and ethical issues is central to who she is as a person.”

The Truman Scholarships are named for Harry S. Truman, president of the U.S. in the latter years of World War II and into the Korean War.

Stanley Chou
Chosen as USC’s 2002 Valedictorian

When Stanley Chou learned that students at Francisco Bravo Medical Magnet High School often scored too low on their SATIs to qualify for USC, he did something about it.

“Here we had a medical magnet high school right beside the Keck School of Medicine [of USC], and a lot of the students couldn’t go to USC,” said Chou. “So we decided to start a mentoring program.”

Chou and several other USC students began weekly visits to tutor Bravo students one-on-one for the SAT.

“We became counselors, helping the kids choose the colleges to apply to and with the admissions process.”

Chou, who received a B.A. in psychology and a B.S. in biomedical engineering May 10, is the Class of 2002 valedictorian. He maintained a 4.0 GPA during his four years as a Trojan, and is a member of numerous honor societies and organizations.

“I was very excited and surprised to be chosen because there are so many talented students,” he said. “It’s an important honor.”

Chou, whose hometown is Irvine, received a University Trustee Award at Convocation this year and was designated a Renaissance Scholar for his study in disparate fields.

Do psychology and biomedical engineering fit together? Chou thinks they do. When studying the central nervous system in biomedical engineering, he said, he found much of the material familiar from psychology.

“We were learning about stuff like schizophrenia, only this time we were down to the cellular level,” said Chou, who plans on a career as a physician. “I definitely want to practice medicine because I love interacting with patients. But I also see myself doing research.”

As for Chou’s most memorable Trojan experience: “My first USC football game was unforgettable.”

– By Bob Calverley,
USC Engineering News

Freshman Class raises the Bar, According to National Survey

USC freshmen are, as a group, becoming more like their peers at other highly selective private institutions. Compared with USC freshmen five years ago, they are more likely to be from out of state, and their parents are more likely to have graduate degrees.

But in several other ways — ethnic diversity, geographic distribution and desire for social interaction, in particular — USC freshmen are strikingly different from their peers nationwide, according to findings from the latest National Freshman Survey.

“We continue to be unique in that the profile of the student that comes here is much more varied,” says Mark Pavelchak, director of student outcomes research in USC’s Office of Student Affairs.

At USC, the 2001 results were compared with those from other selective private institutions — such as Stanford, Caltech, Emory and Duke whose incoming freshmen have an average combined SAT score of 1310 or better. (The mean SAT score for USC’s freshmen in fall 2001 was 1319.)

Pavelchak’s analysis of the latest survey shows that the class of 2005 is more likely to:

Have from more than 500 miles away — 37.7 percent in 2001 compared to 20.9 percent five years ago.

Have a father with a graduate degree — 42.2 percent in 2001 vs. 32.8 percent in 1996. For mothers, the respective figures are 27.5 percent and 19 percent.

Other findings show USC has a much greater percent of low-income and first-generation Latino students among its freshman class. And that freshmen are more likely to name such reasons for attending college as to “become more cultured.”

A detailed report of the 2001 USC freshman survey results is posted on the Web (http://www.usc.edu/student-affairs/sur).

– By Melissa Payton, USC News

1.4 USC College of Letters, Arts & Sciences
Autumn 2002 VOLUME 3 NUMBER 3
Barnes dissertation called ‘magnificent piece of work’

John E. Barnes, associate professor of political sciences, has learned that his dissertation, “Overruled! Congressional Overrides, Judicial Behavior and Court Congress Relations, 1974 to Present,” has been awarded special recognition by the Law and Society Association Dissertation Prize Committee. The association’s president, Susan S. Silbey of MIT, wrote: “It is a magnificent piece of work and should find a large audience when it appears as a book, which I am sure will be soon.” The citation to the Law and Society association read: “In this exceptionally well-written, nuanced and sophisticated project, Barnes begins with a quantitative analysis of the effectiveness of congressional overrides. He couples this with a qualitative exploration of the normative patterns in court-congress relations.”

The dissertation was prepared for his Ph.D. from UC Berkeley in 2001.

Honandgue-Sotelo receives distinguished awards

Pierrette Honandgue-Sotelo, associate professor of sociology, has won three major awards this year for her book, “Domestica: Immigrant Workers Cleaning and Caring in the Shadows of Affluence” (Univ. of California Press). The Pacific Sociological Association’s Distinguished Scholarship Award, The American Sociological Association’s Work and Decisions Section’s Max Weber Award for outstanding book and The Society for the Study of Social Problems’ C. Wright Mills Award. In addition, the Latina/o Section of the American Sociological Association has announced that Honandgue-Sotelo will receive the 2002 Distinguished Contributions of Research Award, for her history of significant contributions to research and for her book “Domestica.”

Mintz wins grant to study infant language development

Psychologist Toby Mintz has been awarded a federal grant of $730,000 to study the mechanisms of early grammatical learning in infants. Associate Professor Mintz’s project is funded by the National Institute of Child Health and Human Development, a division of the National Institutes of Health.

Manis wins grant to study dyslexia

Psychologist Frank Manis has received a $1.75 million grant to study dyslexia. The five-year grant from the National Institute of Child Health and Human Development will support his investigations into the neural, perceptual and linguistic bases of dyslexia in children, including brain imaging studies of normal and disordered readers. Professor Manis hopes his research will lead to better diagnostic tests and treatments for dyslexic children.

Habinek receives fellowship for book on song

Thomas Habinek, professor of classics, has received a fellowship from the American Council of Learned Societies to complete a book on the role of song in society in Archais and Classical Rome.

Nealon featured in Science magazine

Geobiologist Kenneth Nealon was featured in an article in the May 10 issue of Science magazine. The special issue focused on research in environmental microbiology and included a story discussing Nealon’s leading role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field of mental microbiology and included a story discussing Nealon’s lead role in the development of the field of geomicrobiology and his discovery of a bacteria species that metabolizes metals in the development of the field.

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American Philosophical Society taps Tom Jordan

Tom Jordan, director of the Southern California Earthquake Center and the W.M. Keck Foundation Professor of Earth Sciences, has been elected to the American Philosophical Society. The Society, this country’s first learned society, has played an important role in American cultural and intellectual life for over 250 years. It promotes useful knowledge in the sciences and humanities through scholarly research, professional meetings, publications, library resources and community outreach.

Mintz wins grant to study infant language development

Psychologist Toby Mintz has been awarded a federal grant of $730,000 to study the mechanisms of early grammatical learning in infants. Associate Professor Mintz’s project is funded by the National Institute of Child Health and Human Development, a division of the National Institutes of Health.

Selma Holo

Holo wins up Provost’s Writers Series

Selma Holo, professor of museum studies in the Dept. of Art History and director of USC Fisher Gallery, was the final speaker in this year’s Provost’s Distinguished Writers Series in April. Holo read from and discussed her book “Beyond the Prado: Museums and Identity in Democratic Spain.” She also previewed her new book on the politics behind the art and museums of present-day Mexico.

Holo says in “Beyond the Prado” that “the Spanish miracle” — as the transition from Franco’s dictatorship to full-blow democracy has come to be known — is most evident in the country’s museums.

Holo’s talk was part of USC Arts Initiative’s fifth annual festival of the arts.

Sonnenfeld named editor of FCI Review

Albert Sonnenfeld, professor of French & comparative literature, has been appointed editor of FCI Review, the magazine of the French Culinary Institute (FCI) of New York. Sonnenfeld’s translation from Italian of “Culture of the Fork” (Columbia University, 2001) has received enthusiastic reviews. He will be the dinner speaker at the Julia Child 90th Birthday Jubilee at COPIA, American Center for Wine, Food and the Arts, where he serves on the program committee. In addition, Sonnenfeld is in his fourth term on the National Board of Directors of the American Institute of Wine & Food.

Tavarez awarded NIH grant for computational biology study

Simon Tavarez, professor of biological sciences, mathematics and preventive medicine and holder of the George and Louise Kavamoto Chair in Biological Sciences, has been awarded a new NIH grant of $1.65 million to study statistical issues involved in analyzing data from microarray/DNA chips — a method of computing genes expressed in tissue from two different organisms (such as human and chimpanzee) or under two sets of conditions (such as in long-lived fruit flies and normal fruit flies).

Kaplan featured in The New York Times

Carla Kaplan, associate professor of English, was interviewed for a story in the May 20 edition of The New York Times about the life and career of author Zora Neale Hurston, author of “Their Eyes Were Watching God.” Kaplan was quoted as saying: “Hurston worked under harsh conditions, traveling in blistering heat, sleep- ing in her car when ‘colored’ hotels seemed couldn’t be had, defending her- self against jealous women, putting up with bedbugs, lack of sanitation and poor food in some of the turpentine camps, sawmills and phosphate mines she visited.”

Kaplan is also the editor of a collection of Hurston’s letters that is to be published in October.

News from the Master of Professional Writing Program

James Ragan, director of the Master of Professional Writing Program (MPW), received a Recognition Award at the 2002 International Trencianske Teplice Film Festival in Slovak Republic last summer for his continuing contributions through his writing and teaching to the art of world cinema. Ehrich Van Lowe, MPW alumnus and current faculty member, received a 2002 Emmy nomination for Best Situation Comedy (Disney’s “Even Stevens”).

Susan Straight, who studied in the MPW, received a 2002 National Book Award nomination for her novel “Highway Moon.”

MPW alumnus Bryan Dietrich, former Yale Younger Poets Series runner-up, won the Paris Review Prize in Poetry for “Krypton Nights” which includes a $5000 award and publication. The judge was Pulitzer prize-winner Richard Howard.

Current student Torye Mullens won first prize in the “First Draft” National Screenwriting competition for his script “Breathing Underwater” which has been optioned for film by Stephen J. Cannell Productions.

Other Spring 2002 Professional Writing Program Alumni awardees:

Winner, Writers Guild of America Award — Jacob Sager Weinstein, HBO’s “Dennis Miller Show”

Winner, Writers Guild of America Award — Frederick Johnson, ABC’s “All My Children”

Winner, Playboy National Fiction Contest — Morgan Akins

Winner, Guggenheim Fellowship for Fiction — Charles Webb


Los Angeles Times #1, Best Seller List — “If You Lived Here, You’d Be Home by Now” by Sandra Tsing Loh
Student Honors

Awards to USC College Students 2001-2002

Valedictorian - Stanley Chou, Psychology

Salutatorian - Sameer Amin, Biology

University Trustees award winner - Sameer Amin, Biology

University Trustees award winner - Stanley Chou, Psychology

Phi Beta Kappa Undergraduate Award Winner - Lilliana Loofoobourou, Creative Writing/Psychobiology/Music

Phi Beta Kappa Undergraduate Award Winner - Sameer Amin, Biology

Emma Josephine Bradley Bovard Award - Susan Mackie, Biochemistry; Russian minor

Phi Kappa Phi Student Recognition Award - Maria Delucia, Creative Writing

Marshall Scholar - Paul Miller, Political Science/Psychology

Andreas Handelsman, Economics; Music Performance (violin) minor

Katherine FitzSimons, Spanish/Broadcast Journalism;

Cecilia Mo

Cultural Anthropology minor

Mahmood Ghaffar, Political Science/Computer Science

Lilliana Loofoobourou, Creative Writing/Psychobiology/Music

Susan Mackie, Biochemistry; Russian minor

Andrew Bulbrook, Economics; Music Performance (violin) minor

Thomas Meier, Philosophy; Theatre minor

Cecilia Mo, Interdisciplinary Major/Mathematics; Economics minor

Steven Okamoto, Mathematics/Computer Science; Philosophy minor

William Pao, Political Science/Economics/East Asian Languages and Cultures

Jessica Roberts, Political Science; Theatre/French minor

Justin Warren, Aerospace Engineer; German/East Asian Languages and Cultures minor

Judith Wong, Chemistry/Music

Graduating Millon-Minority Fellows

Britany Engelman, International Relations; French minor

Devon Michael Gallegos, Creative Writing; Cinema minor

Tzienn Bi B. Garcia, Anthropology/Fine Arts; Visual Culture minor

John Jimenez, Biology/Music Industry

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Obituaries

Ralph Dills, long-time legislator, 92

Former state Sen. Ralph Dills, (MA ’33), the state’s longest serving lawmaker and one of two California legislators to protest the internment of Japanese Americans during World War II, died May 23. He was 92.

Dills started his career as a teacher in the 1930s. He was a state assemblyman from 1939 until 1949, then served as a Municipal Court judge in Los Angeles County until 1966. He was elected to the Senate in 1966, and was barred from running for re-election in 1998 by term limits.

His last campaign slogan, in 1994, was “too old to quit.”

For taking a stand against President Roosevelt’s internment order, Dills and the late Sen. Jack Shelley, were targeted for expulsion. That effort failed and Dills was honored by the Legislature last year for his protest.

He was also known at the Capitol as one of the Dills Brothers — his brother Clayton Dills served in the Assembly from 1943 to 1966, and another brother, Curly Dills, worked as an elevator operator. All played musical instruments and often played together in jazz bands.

Dills was born in Rostow, Texas, in 1910, moving to California when he was 15 years old. He earned degrees from UCLA and USC.

Fred D. Fagg, III, son of ex-USC presi- dent, 68

Fred D. Fagg, III (BA ’56), former dean of Lewis & Clark Law School and son of former USC President Fred D. Fagg Jr., died April 19 at the age of 68 after battling melanoma. Born in Evanston, Ill., Fagg’s academic and professional accomplishments are respected throughout the legal and academic community. After studying psychology at USC, he earned an M.B.A. from the Harvard School of Business Administration in 1960 and graduated from the University of Michigan Law School in 1963. Upon graduation, he joined the Los Angeles law firm of Overton, Lyman and Prince, where he focused on criminal and civil anti-trust litigation.

Fagg joined the Lewis & Clark Law School in 1970 as an associate professor and became dean just three years later. During his tenure, he guided the school to full accreditation by the American Bar Association, to membership in the American Association of Law Schools and into the Legal Research Center.

His father, Fred D. Fagg Jr., served as USC President from 1946 to 1958 and was the impetus behind a land acquisition program that included the purchase of land near the Los Angeles County Hospital for a health sciences campus.

Philip M. Newman, Superior Court justice, 85

Philip M. Newman, (BA ’40) a former Los Angeles County Municipal and Superior Court judge who worked to provide legal services to the poor, died May 22 in Los Angeles of natural causes. He was 85.

Named to the Municipal Court in 1964 by California Gov. Pat Brown, colleagues elected him presiding judge in 1975, and in August of that year he was elevated to the Superior Court by Gov. Jerry Brown, the former governor’s son.

A devoted advocate for the poor, he was appointed by President Johnson to the national advisory committee for the OEO Legal Services corporation in 1966 – a pioneering federal agency that helped make legal services available to the poor.

Newman was born in Mexico City, and moved with his family to Los Angeles when he was 10. He graduated from USC College and Pacific Coast University School of Law before serving in the Coast Guard during World War II. Mayor Tom Bradley named him chairman of the Los Angeles-Mexico City Sister City Committee in 1974.

Ken Umekubo, Navy pilot, 36

Ken Umekubo, (BA ’88) who had served as a decorated pilot in the United States Navy, died May 19 in Miami, Florida, after an accidental fall. He was 36.

Umekubo graduated with a BA in psychology from USC College in 1988, and was president of the Gamma Epsilon Omega Fraternity. After leaving USC, he attended Naval Aviation School and served as an F-14 Tomcat flight officer until 1994. During deployment to the Persian Gulf, Umekubo flew combat missions over Iraq and air missions during peacemaking operations in Somalia.

He earned an Air Medal for meritorious achievement in combat flying.

Passionate about community service, Umekubo was an active member of the American Asian Drug Abuse Program, Big Brothers Big Sisters of Metropolitan Detroit and the Habitat for Humanity. He also worked closely with high school students to develop programs that discouraged drug use and encouraged education, a commitment that later earned him recognition by President Reagan.

Muñoz-Flores obituary

I am writing to inform you about a mistake in The College Spring 2002 magazine. The obituary for Carlos Muñoz-Flores stated he was of “Columbian” heritage and that he raised his “Columbian niece.” Please be aware that this South American country is spelled C-O-L-O-M-B-I-A with an O not a U. It is a common error, yet a serious one. Being of Columbian descent myself, it can be insulting to see quality publications such as yours not catch this. Please notify your editing staff and make the appropriate corrections. Thanks.

Sincerely,

Anna Garcia, Class of 2000

(Well, Anna, we hope you still think of us as a quality magazine. Even if we can’t spell.)

The USC College Magazine welcomes communications from our readers and, space allowing, will endeavor to publish those that are of general interest.
New to the Faculty

New faculty joining USC College include those with expertise ranging from international relations, economics and sociology to the cross-disciplinary fields of computational physics, genomics and neuroscience. Each new faculty member brings academic reputation and promise that will help provide students with a rich and diverse learning experience.

"We are very pleased with the world-class reputation of faculty who recently joined the College," says Beth Meyerowitz, dean of faculty in the College. "Their individual expertise will add to the diverse and dynamic College community and strengthen scholarship at all levels as we accomplish our strategic plan."

New faces include:

**Waterman Wins Gairdner Award for Innovative Genomics Research**

University Professor Michael S. Waterman was named a recipient of the 2002 Gairdner International Award last spring.

Now in its 43rd year, the annual award is bestowed for outstanding contributions by medical scientists whose work will significantly improve the quality of life. This year’s honorees are all top contributors to the field of genomics research.

Waterman is the USC Associates Professor of Mathematics and Natural Science in USC College and a professor of mathematics, biological sciences and computer science. He is often called the father of computational biology — which is the modern marriage of computer science, statistics and molecular genetics that is paving the way toward a future era of biomedical revolutions, many scientists believe.

"Mike Waterman is richly deserving of the Gairdner Award," says Joseph Aoun, dean of USC College. "And it is fitting that he shares it with others who, like him, are largely responsible for the dramatic leaps in understanding that have been achieved in the field of genomics."

"He has brought his brilliance into play at USC and made this university a world leader in the drama of genomics that is now unfolding, Mike and his colleagues in computational biology will continue to be heard from, and their contributions will serve well both scholarship and human health." Waterman’s mark appears behind many of today’s standard procedures of computational biology, says David Eisenberg, professor of molecular biology and director of the UCLA-Department of Energy Laboratory of Structural Biology and Molecular Medicine. "His work has advanced biological sequence analysis from a collection of ad hoc procedures to a rigorous and mature subject."
Helping Women Pursue Science

Caroline A. Kovac, ’81, was inducted into the Women in Technology International Hall of Fame (WITI) June 20. She received a Ph.D. in chemistry from USC College, now lives in Connecticut and works for IBM.

One of only three women in the world to receive the honor this year, Kovac was recognized for her work at IBM and for offering encouragement to women interested in pursuing science careers.

After leaving USC, Kovac joined IBM where she launched the cutting-edge IBM Life Sciences Solutions – an IBM business designed to help life science organizations accelerate drug discovery and turn the vast quantities of data from the Human Genome Project and other research efforts into useful scientific information.

Induction into WITI requires more than just a stellar resume, however.

Each year Kovac visits schools to talk about the importance of studying science. “Generating an interest early on is crucial,” says Kovac. “If you don’t take math and science in high school, it’s very unlikely that you will go back and do it later.”

At IBM, she has organized cadres of employees to develop programs that encourage K-12 girls to pursue education in science. And, has formed mentoring pipelines to support women scientists throughout their career.

Women, who constitute almost half of the American labor force, fill only 12 percent of the nation’s jobs in science, engineering and technology, according to the National Council for Research on Women.

— By Nicole St. Pierre

Easterlin is Named to NAS

Richard A. Easterlin, an economist and professor at USC College, has been elected to the National Academy of Sciences in recognition of his distinguished and continuing achievements in original research.

Election to membership in the academy is considered one of the highest honors that can be accorded a U.S. scientist or engineer.

“In his distinguished career, Easterlin has become an internationally known scholar for his work studying how economies influence society, focusing on history, population changes and the relationship between wealth and happiness,” says Joseph Aoun, dean of USC College.

“Yet, here in the College, he is as well respected for his love of teaching, especially undergraduates,” added Aoun. “He is one of our finest teachers.”

In 1988, Easterlin received a USC Raichenheimer Award, recognizing his exemplary teaching, research and service to the College.

Clearly evident in Easterlin’s research is his affinity for empirical research and his approach to economic study as a subject concerned with real life situations instead of purely theoretical ideas.

“My work has chiefly focused on the explanation of empirical problems that I found interesting,” says Easterlin, who has been a professor at the College since 1982.

“I enjoy the freedom of a scholar to study and try to understand the world about him.”

For Easterlin, some of the most intriguing subjects are understanding the long swings in population and the economy, the American baby boom and bust, the demographic transition — in both fertility and mortality — and the relation of economic growth to subjective welfare.

In his studies of economic history and development, Easterlin has written extensively about the worldwide spread of industrialization since 1800, shedding light on the nature of this development, its causes and consequences.

His research in the field of economic demography has revealed the role of economic conditions in determining large-scale shifts in populations, including rates of birth, death, marriage and migration around the globe.

Perhaps most well-known for his “Easterlin Hypothesis,” he developed the idea that relative income — how people assess how well off they are relative to society — will determine their behavior.

Easterlin, who is a USC University Professor, is recognized as the founder of the branch of research that looks at how personal wealth relates to an individual’s sense of contentment. More than 25 years ago, he noticed that although Americans were generally gaining wealth, surveys showed that people were no more content with their lives than they had been with less money. Originally, his work to define the relationship between financial assets and happiness was not well accepted, but today the field of economic welfare is considered a fertile and important research area.

In 1985, he co-authored the book “The Fertility Revolution” with his wife Eileen Crimmins, a USC professor of demography and demographic research. In collaboration with Crimmins, he developed a framework for analyzing social and economic aspects of fertility transitions.

Alumni Association Leader Joins USC Board of Trustees

San Diego attorney Ann Lipscomb Hill has been elected to the University of Southern California Board of Trustees. Hill has two degrees from USC College: she earned her bachelor’s degree in English in 1971 and her master’s degree in American Studies in 1974. She earned a J.D. from Southwestern University School of Law in 1977.

In announcing Hill’s election, President Steven B. Sample praised Hill’s dedication, energy and enthusiasm.

“Alumni such as Ann are key to USC’s growth and leadership in the 21st century,” says Sample. “She is precisely the kind of leader that we look for — accomplished, hardworking and committed — when our board of trustees recruits new members.”

Hill is president-elect of the USC Alumni Association’s board of governors and co-chair of its alumni organizations committee.

A past president of both the Trojan League of San Diego and the Association of Trojan Leagues, she is a member of the San Diego USC Leadership Council and the USC Alumni Coordinating Council.

In 2002, she received a USC Alumni Service Award, recognizing her outstanding volunteer efforts on behalf of the university. “It has been a profound honor to serve on the Alumni Association’s board of governors, and I look forward to the challenge of serving USC as a trustee,” says Hill.

“The inspired leadership of President Sample and the unprece- dented excellence of our staff at Wdney Alumni House have created a wonderful blueprint for the world-wide expansion of the USC Alumni Association,” she says.
The Smoke that Satisfies, Terrifies
Marijuana: neither harmless nor tragically toxic

nt is the world’s most commonly used illicit drug, and perhaps the most controversial of all substances. Marijuana has been at the center of debate for decades, with equal numbers calling for its legalization and ban. In his new book, “Understanding Marijuana” (Oxford University Press, 2002), Mitch Earleywine, an associate professor of psychology at USC College, attempts to sort out myths and facts about the drug. After analyzing some 500 studies, Earleywine’s ultimate conclusion is mixed — marijuana is neither completely harmless nor tragically toxic.

“The common human desire is to split the world into two categories,” says Earleywine, an expert on substance abuse and personality. “Decisions are easier when everything is black or white. Yet the world remains in glorious color.”

Earleywine looks at the history of medical and recreational marijuana use, cannabis pharmacology, health effects and treatment. After examining studies dating from 1681 to 2001, Earleywine has arrived at a number of conclusions, including:

Daily marijuana use alters brain function. About 10 percent of regular users develop troubles ranging from memory lapses and paranoia to an increased tolerance to the drug. Marijuana does not spur aggressive behavior or impede motivation.

Marijuana is not a gateway drug and is less harmful than tobacco and alcohol. Less than 1 percent of marijuana users try heroin.

While marijuana does help glaucoma, it is not as effective as recently developed Canasol eye drops, which do not cause any intoxication and last much longer.

Users cannot learn new material while they are high on marijuana. Studies show an impairment in “free recall” memory and find that users are unable to separate relevant from irrelevant stimuli.

Unlike alcohol or aspirin, marijuana has never been known to cause a lethal overdose. Earleywine cautions that an incomplete reading of research can support any argument for or against marijuana. After examining the studies, he found that some researchers ignored crucial information and data in their final analyses.

For example, he said, studies slanted against marijuana legalization mention that tetrahydrocannabinol (THC), the main active chemical in marijuana, often appears in the blood of people involved in auto accidents. But the studies fail to mention that most of these people also had high blood-alcohol levels.

Similarly, studies slanted in favor of marijuana legalization cite a large study that showed no sign of memory problems in chronic marijuana smokers. However, they neglect to mention that the tests were so easy that even a young child could perform them.

— By Gilles Stidby, USC News
Does Mating Between Species Pose Harm?

Edmands studies tiny organisms to help answer big questions.

Y
ou’ve probably never heard of it, but the tiny tidepool cope-
pod could one day help answer one of the biggest questions of evolution: What happens when one species splits into two?

Suzanne Edmands, assistant pro-
fessor of marine biology in USC College, uses the microscopic water-
borne organism to understand the genetic consequences of hybridiza-
tion between populations on the route to becoming new species. It is well known that mating between close relatives often results in less fit offspring. What is less well known is that mating between geneti-
cally distant members of the same species can lead to a decline in off-
spring fitness, a condition known as “outbreeding depression.” It is a sub-
ject that fascinates conservation biol-
ogists like Edmands, who joined the
College faculty in 1998.

By studying the tidepool copepod – an organism preferred by Edmands for its short lifespan and propensity to be easily cultured – she tests the relationship between parental related-
ness and offspring fitness. When hybrids are unfit, she looks at the genetic mechanisms underlying reduced fitness.

“Understanding this phenomenon has important conservation impli-
cations, since relocating species from one region of the country to another is becoming a common method of expanding endangered populations,” says Edmands.

For instance, a recent decision to augment Florida panthers with pan-
thers from Texas (the closest avail-
able population) has caused consid-
erable debate within the conserva-
tion community. A better under-
standing of the genetic conse-
quences of population mixing will help us understand whether strate-
gies like this will be more likely to cure inbreeding depression or to cause outbreeding depression.

Edmands’ lab is developing a map to identify and characterize regions of the genome that do not interact well when different popula-
tions mate and to monitor long-term genetic changes in hybridizing popu-
lations. “This is not just a marine question. We’re using these cope-
pods as a model for understanding the earliest stages of speciation,” says Edmands. In the future, she hopes to broaden her research in genetics to study outbreeding depression in other species. As a step towards predicting when out-
breeding depression will be most severe, she has collaborated with computer programmer Charles Timmerman to develop a model of the fitness consequences of popula-
tion mixing.

A second focus of ongoing research in the Edmands’ lab involves studies of marine life signif-
ificantly larger than the tiny tidepool copepod. By collecting gene samples from throughout the range of fish species, such as striped marlin and kelp bass, members of Edmands’ lab group strive to understand the con-
nectivity and stability of marine populations.

Edmands now spends as much time in front of the computer screen as she does peering into the microscope, but her passion is teaching and she places a pre-
mium on student interaction. At the College she has taught popular biolo-
gy courses such as Conservation Biology, the Natural History of California, and Evolution & Population Genetics. Equally curious about conservation biology is her lab staff, made up of one postdoctoral researcher, three Ph.D. students and two undergraduates. And while all have a particular fondness for marine biology, they are excited to be part of a research program that could be applied to other fields.

“The genetic research we are doing gives us an understanding of how populations replace themselves in a marine setting, and it has real-world relevance, from dealing with problems and issues facing fisheries around the country to framing future environmental management plans and ideas,” says Augie Vogel, a Ph.D. student in Edmands’ lab.

Edmands’ interest in evolution and the genetic consequences that arise from breeding began at the Univ. of Calif., Santa Cruz, where she received a Ph.D. after completing a dissertation on the mating systems of sea anemones.

Her post-doctoral work at the Scripps Institution of Oceanography focused on the genetic structure of sea urchins — a topic highly rele-
vant to many California fishermen whose livelihood depends on the red sea urchin. Her research found that urchins from different locations are surprisingly divergent; suggesting that there is less dispersal than might be expected for a species whose larvae can float for more than a month before settling. That means that when urchins are over fished in one location, we cannot assume the region will be popu-
lated by larvae produced by healthi-
er populations somewhere else.

This is a subject of concern for conservation biologists like Edmands and eventually could impact the livelihood of fishermen.

“It’s the diversity and sheer hazzariness of marine organisms that first drew me to marine biology,” she says. “But it’s the potential to use marine creatures to address evolu-
tionary questions that caused me to stick with it as a career.”

Sometimes it is the tiniest organ-
isms that help answer the biggest
questions.

– By Nicole St. Pierre