

Caltech 336

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The campus community biweekly

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H₂O commandos!



Students boldly go where decades of Caltech undergrads have gone before, commandeering the campus on the Institute's annual Ditch Day. It was May 17th, frosh!

Biochemical "on-off" switch discovered

Proteins are the cell's arbiters. In a complex and still largely mysterious cascade of events, proteins tell a cell when to divide and grow—and when to die. To properly control cell behavior, proteins need to be turned on when they are needed, and turned off when they are not. Now a Caltech biologist and his colleagues have shed important new light on how this takes place in animals and plants.

In a paper published in the May 18 issue of the journal *Science*, Associate Professor of Biology Raymond Deshaies and his graduate students show that an assemblage of proteins known as CSN may serve as a kind of biochemical on-off switch for other proteins.

In plants, research done in the laboratory of Deshaies's collaborator, Xing-Wang Deng of Yale University, has shown that CSN prevents photomorphogenesis (roughly, the growth of plants controlled by light) when light is absent. CSN is widely distributed in animals as well, but until now no one knew what any of its functions were. Now Deshaies's research shows that CSN may be linked to a recently discovered protein modifi-

see Switch, page 6

A little help from Caltech friends

Last fall, 32 students at Littlerock High School, east of Lancaster, weren't thinking about their new textbooks and teachers. Instead they were focused on the satellite they had to finish building before June.

With the help of Caltech postdoctoral scholar Ravinder Bhatia, the students designed and built a satellite mock-up that, if deployed, would observe stratospheric ozone depletion in the northern hemisphere over a three-year period.

see Satellite, page 6



Ravinder Bhatia and Brian Keating help students display their satellite mock-up.

Royal honors bestowed on Zewail, Kulkarni



Ahmed Zewail



Shrinivas Kulkarni

Joining the distinguished company of science greats Isaac Newton, Charles Darwin, Albert Einstein, and Stephen Hawking, Caltech's Ahmed Zewail and Shrinivas Kulkarni have been elected to the Royal Society, one of the oldest and most prestigious international scientific societies.

Nobel Prize winner Ahmed Zewail, the Pauling Professor of Chemical Physics and professor of physics at Caltech, was elected as a foreign member of the Royal Society for his pioneering development of a new laser-based field that, as recognized by the Nobel Prize, caused a revolution in chemistry and adjacent sciences.

see Royal Society, page 6



Bjorkman elected to NAS

Caltech's Pamela Bjorkman, professor of and executive officer for biology, is one of 72 American scientists elected this year to membership in the National Academy of Sciences (NAS). The announcement was made at the academy's 138th annual meeting this month in Washington.

Bjorkman, who has been on the Caltech faculty since 1988, is the Institute's first female faculty member to be elected to the NAS. She focuses much of her research on molecules involved in cell-surface recognition, particularly molecules of the immune system. Investigators in her lab use a combined approach, including X-ray crystallography to determine three-dimensional structures; molecular biological techniques to produce proteins and to modify them; and biochemistry to study the proteins' properties.

Much of the Bjorkman lab's efforts have involved proteins known as class I MHC, as well as very similar proteins that have a number of functions aside from an immunological role. In a 1999 study, for example, Bjorkman and her colleagues determined the three-dimensional structure of a protein that causes cachexia, a wasting syndrome in cancer and AIDS patients. The discovery provided the scientific basis for possible future strategies for controlling cachexia and/or for the treatment of obesity.

A native of Portland, Oregon, Bjorkman earned her bachelor's degree from the University of Oregon in 1978 and her doctorate from Harvard University in 1984. Afterward, she held postdoctoral positions at Harvard and the Stanford University School of Medicine. She is an investigator with the Howard Hughes Medical Institute and has been a Pew Scholar in the biomedical sciences, an American Cancer Society Postdoctoral Fellow, and an American Society of Histocompatibility and Immunogenetics Young Investigator.

Bjorkman has also received the William B. Coley Award for Distinguished Research in Fundamental Immunology, the Gairdner Foundation International Award for achievements in medical science, and the Paul Ehrlich and Ludwig Darmstaedter Award.

Bjorkman's election to the National Academy of Sciences brings to 67 the number of living Caltech professors and professors emeritus who have earned the prestigious honor. The National Academy, established in 1863 by President Lincoln, acts as an advisory body for the federal government on scientific matters.

The world will soon be their lab

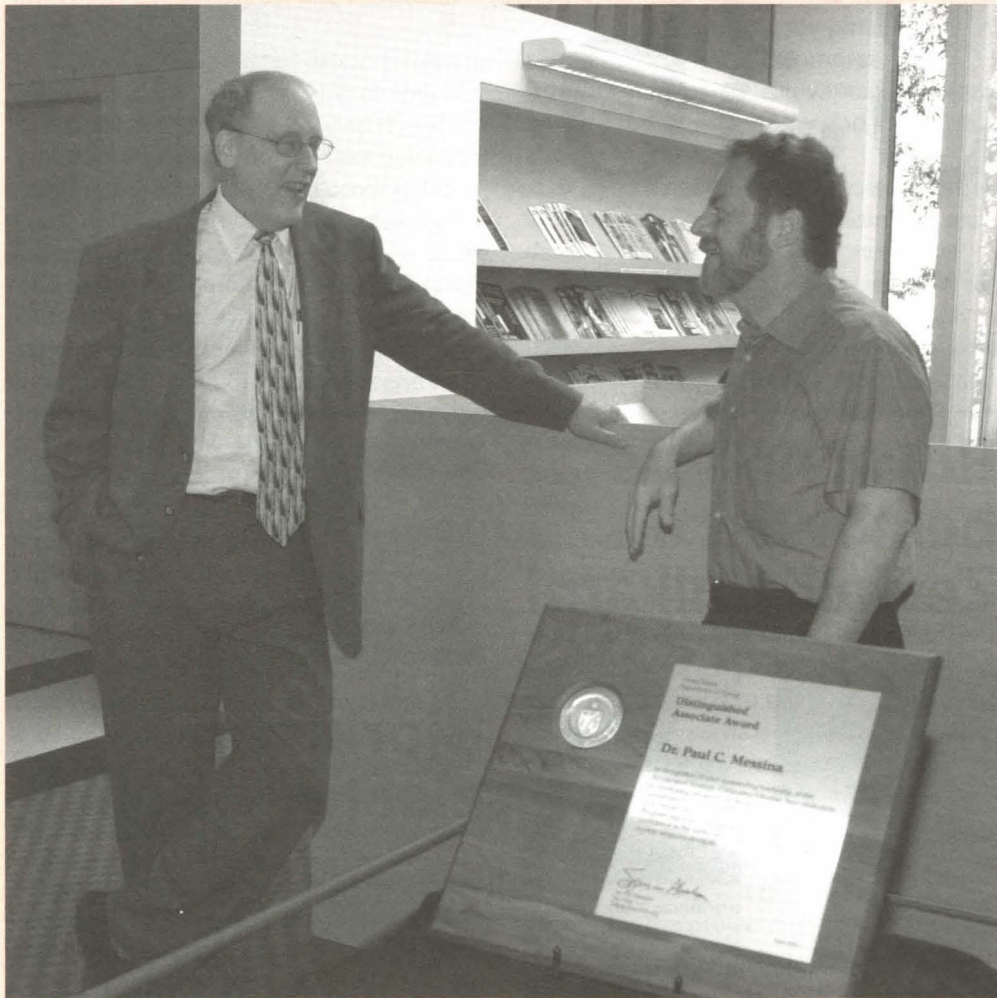
Caltech students with an interest in marine science will soon be conducting research aboard the rolling deck of a Boston whaler at sea, or while kneeling in the wet sand of a Southern California estuary. Such real-world learning will be part of a new Environmental Science and Engineering program funded by a five-year, \$700,000 grant from the Henry Luce Foundation.

Intended for both graduate and undergraduate students, the ESE program will be interdisciplinary in its approach, spanning the fields of geology, engineering, and chemistry. For the graduate students, the goal is to unify and enlarge environmental teaching and research at Caltech. Undergraduates will have the opportunity to take a lab class in environmental analysis. "The students here have a ton of skills in mathematics, biology, chemistry, and physics," says Jess Adkins, a Caltech assistant professor of geochemistry and global environmental science, "and a number are interested in the environment, but don't quite know what direction to go in with that interest." The ESE program will help provide that direction, he says.

The laboratory class will immerse undergraduates in field-based research. Typically, Adkins says, the lab experience in many classes is limited to textbook problems and off-the-shelf samples that

see Grant, page 6

NewsBriefs



Caltech's Paul Messina, right, received the Distinguished Associate award from David Crandall of the U.S. Department of Energy on May 25. The citation commends Messina for his achievements in computational science and for his contributions to the DOE's Stockpile Stewardship program, designed to ensure the safety and reliability of the nation's nuclear weapons arsenal.

Honors and awards

Mory Gharib, professor of aeronautics and faculty member in bioengineering, was invited by the American Association for Thoracic Surgery (AATS) to give the Honored Speaker address to the 81st annual AATS conference on May 8 in San Diego. Speaking at the San Diego Convention Center to a gathering of 3,000 thoracic surgeons from all around the world, he discussed the challenges and rewards of applying bioengineering principles to space exploration.

Elliot Meyerowitz, professor of biology and chair of the biology division, has been named a Wilbur Lucius Cross Medal winner for 2001. In announcing the award, Yale University cited Meyerowitz's contributions to *Drosophila* (fruit fly) genetics and developmental biology early in his career, and his more recent discovery that *Arabidopsis thaliana* has the smallest genome of any of the known higher plants, which "spurred a revolution in the plant biology community." The medal was awarded on May 20 at Yale's commencement convocation.

Personals

New positions

Chris Wendrowski will join Caltech on June 11 as Physical Plant's associate director of engineering and construction management; the Institute had been conducting a search to fill this position since Mike McCallan announced his retirement plans last January. Currently the capital program manager for the general project section of Los Angeles County's department of public works, he holds a bachelor's degree in civil engineering from Lawrence Technological University and brings to Caltech 20 years of experience in design and construction.

Media minute

Associates celebrate 75 years

A May 19 *Pasadena Star News* article covered highlights from the Caltech Associates' recent 75th anniversary celebration dinner, which brought more than 300 Institute friends together for an evening at the Athenaeum. Founded in 1926, the Associates are a nationwide group of individuals dedicated to supporting Caltech.

The event featured Goldberger Professor of Physics **Andrew Lange**, who talked about his research at the South Pole, and a panel discussion with three Caltech presidents—**Harold Brown**, **Thomas Everhart**, and **David Baltimore**—moderated by Beckman Professor of Chemistry **Harry Gray**.

A bubble in time

Inspired by the effervescence in a glass of soda, Caltech/JPL staff member **Fred Romberg** has created a clock made of bubbles, reported the British journal *New Scientist* in its May 5 issue. A staffer at Caltech's Residence Life office and at JPL's communications ground systems section, Romberg said, "I thought that if I could control the motion of the bubbles, I could start making letters, numbers and other shapes with them." His prototype clock has two sheets of glass forming a narrow tank filled with baby oil. Valves at the tank's bottom, controlled by a microchip, release bubbles of dye that rise slowly to the top in either a digital or analog time display. Said Peter Church, of the Technology Innovation Centre at the University of Central England, "It's a gimmick. But I'm sure motor cars seemed a gimmick once."

Job prospects for graduates still good

The May 18 issue of the *Contra Costa Times* quotes **Jerry Houser**, director of Caltech's career development center, on the job outlook for high-tech graduates. Despite the slowing economy and the dot-com bust, Houser maintains, "It's still a very bright future for undergrads this summer and this year—those that are educated, skilled and connected." The article noted that **Caltech**, Cal Poly San Luis Obispo, and Stanford have each recently had companies rescind job offers to a few students. Overall, however, analysts agree that while grads can no longer expect ardent pursuit and free pizzas from desperate companies, as in the heady days of the high-tech boom, jobs are still plentiful, albeit more competitive.

A whirlwind of commencement events

The activities offered for Caltech's 107th commencement are designed to give families and friends a snapshot of the singular world in which their graduates have been living for the past several years.

Beginning on Thursday, June 14, visitors may enjoy a welcoming buffet lunch at Avery House. In addition to taking self-guided tours that are available throughout the day, visitors may go to Ramo Auditorium at 1 p.m. to watch a video of the design contest entered by students in Mechanical Engineering 72. It will be followed by presentations made by SURF award winners and by student videos of Senior Ditch Day activities. The stacks left standing in the student houses will be available for tours immediately following.

Visitors may accept President Baltimore and Dr. Huang's invitation to a reception in the President's Garden from 4 to 6 p.m. Graduating seniors and their families are also invited to a banquet, beginning at 6 p.m. at the Athenaeum. The day will wrap with a concert featuring the Caltech Chamber Singers at 8:30 p.m. in Dabney Lounge.

Commencement exercises will begin at 10 a.m. on Beckman Mall. This year, Gordon Moore, one of the fathers of the modern microprocessor and a Caltech alumnus (class of 1954), will deliver the commencement address.

Early numbers indicate that the pool of graduates includes 207 candidates who will be eligible for their bachelor's degree, 83 for their master's degree, and 157 for their PhD.

A noontime reception for the graduates will follow on the Athenaeum lawn.

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Summer dance classes for kids

The Caltech Dance Troupe is sponsoring two dance classes this summer for children of Caltech students, faculty, and staff, and of JPL employees.

The classes are open to both boys and girls, and will meet on eight Saturdays, from June 23 to August 11, in the Braun Athletic Center multipurpose room. No special clothing or shoes are required, and the cost of each class is \$25 for the summer. A parent or guardian must accompany the child to class sessions.

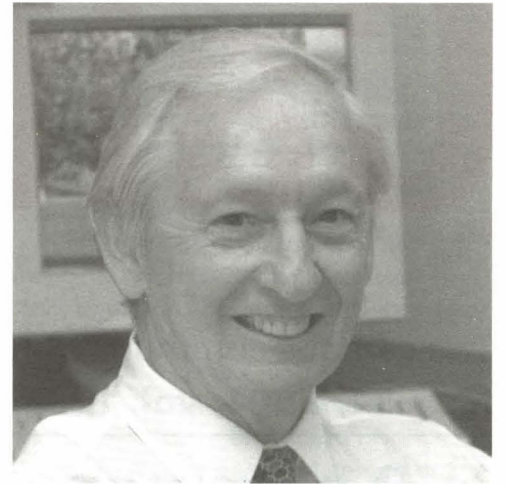
For children ages 3 to 5 years (child must be 3 years old by the first day of class), there will be a 45-minute "Fun With Movement" class from 1 to 1:45 p.m. These classes are designed to instruct children on the basics of rhythm, balance, coordination, and interpretative movement in a fun, social setting.

The second class, a one-hour beginning ballet class, is for children who have completed kindergarten, first, or second grade, and will meet from 2 to 3 p.m. In addition to the skill sets mentioned above, this class will also teach basic ballet movements.

If you have specific questions, please e-mail sarah@cheme.caltech.edu. To sign up, send your child's name, age, birth date, and highest grade level completed, along with your contact information, to troupe@caltech.edu. Please note that everyone entering the Braun Athletic Center must have a summer membership at the gym, or will pay a guest fee. For information on membership fees, contact the Recreation Office at ext. 3252.

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McCallan bids adieu



Take a stroll down one of the leafy paths that wind through campus, or step inside one of the buildings. Chances are that Mike McCallan had a hand in the design and construction of the structure in which you find yourself and the path you took to get there. In fact, a great part of the campus looks and feels the way it does because of him.

As Caltech's associate director of engineering and construction management for more than two decades, McCallan has wielded tremendous influence steering the design and ensuring the structural integrity of dozens of lecture halls, labs, and office buildings.

He and his staff see to it that, from concept to ribbon cutting, construction projects are completed with the best materials, on schedule, and within their allotted budgets.

Now, after an impressive 45 years spent building a career distinguished by a remarkable climb from carpenter to the top management post in his department, he will retire at the end of June.

McCallan first stepped foot on campus as a carpenter in 1956, fresh from Northern Ireland, and you can still catch a light County Tyrone brogue in his words. The move was fueled by youthful dreams of America, the same ones shared by generations of immigrants before him.

"I was experimenting with America," he said. "I thought I'd come for a short time and probably go home." Instead, he found a small college in need of carpentry skills acquired during four years at technical college and the Belfast College of Technology.

Two weeks after arriving in the United States, he reported to work at Physical Plant. Soon enough, the 20-year-old Billy—his given name is actually William—was approached by a fellow carpenter.

"He said, 'Since my name's Bill and there's another Bill here, and since you're Irish, it's going to have to be either Pat or Mike,'" McCallan remembered with a smile. Knowing that his mother would object to the former, Billy gave way to Mike, a name that has become a part of his campus identity as much as the suits he wears every day.

The newly christened Mike worked in the shop for two years, constructing case-work and cabinetry for labs, until the government came knocking. Although still a British citizen, he was drafted by the Army. Having no desire to enter the military, but wanting to remain in the United States, he reported for duty in December of 1958.

see McCallan, page 5

June 4–17

Events in roman type are open to the public
Events in *italic type* are open to the Caltech community only

Monday, June 4

Special Kellogg Seminar
Lauritsen Library, 2 p.m.—“Quarkstars: A Third Class of Compact Objects?”, Jurgen Schaffner-Bielich, RIKEN BNL Research Center, Brookhaven National Laboratory.

Thesis Seminar
153 Noyes, Sturdivant Lecture Hall, 2 p.m.—“Mechanism and Activity of Ruthenium Olefin Metathesis Catalysts,” Melanie S. Sanford, graduate student in chemistry, Caltech.

Geological and Planetary Sciences Seminar
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“Mantle Plumes and How to Catch Them,” Celâl Sengör, Moore Distinguished Scholar in Geology, Caltech. Refreshments, 151 Arms, 3:45 p.m.

Inorganic-Electrochemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—Topic to be announced. Susannah Scott, associate professor and Canada Research Chair in Chemistry, department of chemistry, University of Ottawa.

Solid State Sciences Seminar (S^5)
102 Steele, 4 p.m.—“Single Electron and Spin Effects in AFM Defined Quantum Dots and Rings,” Professor Klaus Ensslin, Solid State Physics Laboratory, Swiss Federal Institute of Technology (ETH), Zurich. Refreshments, Watson foyer, 3:45 p.m. Information: www.its.caltech.edu/~s5.

Astronomy Tea Talk
106 Robinson, 4:15 p.m.—“The Stellar Populations of Lyman Alpha Emitting Galaxies at z = 2.4,” Massimo Stiavelli, Space Science Telescope Institute.

Tuesday, June 5

IR Sub-mm mm Sack Lunch
469 Lauritsen, 12:15 p.m.—“Resolving High-Velocity Clouds in the Narrow-Line Region of NGC1068: Associated Absorbers Seen in Emission?”, Professor Gerald Cecil, department of physics and astronomy, University of North Carolina at Chapel Hill. Information: www.its.caltech.edu/~sawicki/sacklunch.html.

Chemical Physics Seminar
147 Noyes, Sturdivant Lecture Hall, 2 p.m.—“Dynamics of Chemical Reactions of Molecular Di-Cations,” Professor Zdenek Herman, Joint Institute for Laboratory Astrophysics (JILA), University of Colorado at Boulder, and the J. Heyrovsky Institute of Physical Chemistry, Czech Academy of Sciences.

Wednesday, June 6

Special Kellogg Seminar
Lauritsen Library, noon—“Probing Nucleon Structure via Higher Order Polarizabilities,” Professor Barry Holstein, department of physics, University of Massachusetts, Amherst.

Environmental Engineering Science and Global Environmental Science Seminar
142 Keck, 4 p.m.—Topic to be announced. Ray Weiss, professor of geochemistry, UC San Diego. Refreshments, lobby, 3:45 p.m.

Wiersma Lecture
24 Beckman Labs, 4 p.m.—“Genetic and Pharmacological Studies of Complex Behaviors: Learning, Attention, and Impulsivity,” Professor Jeanne Wehner, Institute for Behavioral Genetics, University of Colorado, Boulder.

Thursday, June 7

Civil Engineering Seminar
206 Thomas, 4 p.m.—“Performance-Based Design of the Broad Center Using ‘Non-Buckling’ Steel,” Atila Zekioglu, managing principal, Arup, Los Angeles. Refreshments, 210 Thomas, 3:45 p.m.

Physics Research Conference
201 E. Bridge, 4 p.m.—“The Sloan Digital Sky Survey,” Gillian Knapp, professor of astrophysical sciences, Princeton University. Refreshments, 108 East Bridge, 3:45 p.m. Information: www.pma.caltech.edu/~physcoll/PhysColl.html.

Friday, June 8

Caltech/JPL Association for Gravitational-Wave Research Seminar Series
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“The Capture of Compact Objects by Massive Black Holes and Its Implications for LISA,” Sterl Phinney, professor of theoretical astrophysics, Caltech.

Monday, June 11

Thesis Seminar
147 Noyes, Sturdivant Lecture Hall, 1:30 p.m.—“The Electrical Properties of Nanoscale Parallel Semiconductor Interfaces,” Robert C. Rossi, graduate student in chemistry.

Tuesday, June 12

IR Sub-mm mm Sack Lunch
469 Lauritsen, 12:15 p.m.—“Atomic Oxygen in Molecular Clouds,” Charlotte Vastel, Centre d’Etude Spatiale des Rayonnements, Toulouse. Information: www.its.caltech.edu/~sawicki/sacklunch.html.

Thursday, June 14

Herbert Newby McCoy Award Seminar
153 Noyes, Sturdivant Lecture Hall, 2 to 2:30 p.m.—“Shaving Levinthal with Occam’s Razor,” Derek A. Debe, graduate student in chemistry, Caltech.

Herbert Newby McCoy Award Seminar
153 Noyes, Sturdivant Lecture Hall, 2:30 to 3 p.m.—“Strange and Unconventional Isotopic Effects in Ozone Formation,” Yi Qin Gao, graduate student in chemistry, Caltech.

Herbert Newby McCoy Award Seminar
153 Noyes, Sturdivant Lecture Hall, 3:15 to 3:45 p.m.—“Computational Studies of Heterogeneous Catalysis on Late Transition Metals,” Jeremy S. Kua, graduate student in chemistry, Caltech.

Herbert Newby McCoy Award Seminar
153 Noyes, Sturdivant Lecture Hall, 3:45 to 4:15 p.m.—“Mechanism and Activity of Ruthenium Olefin Metathesis Catalysts,” Melanie S. Sanford, graduate student in chemistry, Caltech.

Physics Research Conference
201 E. Bridge, 4 p.m.—Topic to be announced. Arthur B. McDonald, professor of physics and director, Sudbury Neutrino Observatory Institute, Queen’s University at Kingston, Ontario, Canada. Information: www.pma.caltech.edu/~physcoll/PhysColl.html. Refreshments, 108 East Bridge, 3:45 p.m.

Herbert Newby McCoy Award Seminar
153 Noyes, Sturdivant Lecture Hall, 4:15 to 4:45 p.m.—“Electron Tunneling in Protein Crystals,” F. Akif Tezcan, graduate student in chemistry, Caltech.

Friday, June 15

107th Annual Commencement
Beckman Mall, 10 a.m.—The speaker will be Gordon E. Moore, PhD, chairman of the board of trustees, emeritus, Caltech, and chairman emeritus, Intel Corporation.

CampusEvents

Monday, June 4

Baby Furniture and Household Equipment Pool

234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Ballroom Dance Club

Winnett lounge, 7:30 to 9:30 p.m.—Argentine tango for beginners. Last of five weekly lessons taught by a professional instructor. No partner or experience is required. \$4 per class for Caltech undergraduates, \$6 for others. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Ballroom Mini Dance Party

Winnett lounge, 9 to 11 p.m.—Open dancing; make requests or bring your own music. No admission charge and no partner needed. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Tuesday, June 5

Auditions for TACIT Fall Play

Ramo Auditorium, 7:30 to 9:30 p.m.—Auditions for the fall-term production of Tennessee Williams’s *The Notebook of Trigorin* are open to all members of the Caltech community. Information: 395-6259, tacit@its.caltech.edu, or www.its.caltech.edu/~tacit.

Wednesday, June 6

Baby Furniture and Household Equipment Pool

234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Service Awards Ceremony

Beckman Auditorium, 10 a.m. to noon—A reception in the Beckman Institute courtyard will follow the ceremony. Information: 395-6001 or diana.alvarez@caltech.edu.

Auditions for TACIT Fall Play

Ramo Auditorium, 7:30 to 9:30 p.m.—Auditions for the fall-term production of Tennessee Williams’s *The Notebook of Trigorin* are open to all members of the Caltech community. Information: 395-6259, tacit@its.caltech.edu, or www.its.caltech.edu/~tacit.

Friday, June 8

Caltech Y Noon Concert

Winnett quad, noon—Guitarist David Harris will create rich, mystic harmonies. Information: 395-6163 or visit the Caltech Y at www.y.caltech.edu/.

Six Characters in Search of an Author

Ramo Auditorium, 8 p.m.—Theater Arts at Caltech presents the classic play by Nobel Laureate Luigi Pirandello in a modern adaptation by Robert Brustein. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Saturday, June 9

Auditions for TACIT Fall Play

Ramo Auditorium, 1:30 to 4:30 p.m.—Auditions for the fall-term production of Tennessee Williams’s *The Notebook of Trigorin* are open to all members of the Caltech community. Information: 395-6259, tacit@its.caltech.edu, or www.its.caltech.edu/~tacit.

Caltech Y Decompression

Winnett quad, 7 to 11 p.m.—Prefinals fun-and-social drop-in. Information: 395-6163 or visit the Caltech Y at www.y.caltech.edu.

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Sunday, June 10

Six Characters in Search of an Author

Ramo Auditorium, 2 p.m. (final performance)—Theater Arts at Caltech presents the classic play by Nobel Laureate Luigi Pirandello in a modern adaptation by Robert Brustein. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Skeptics Society Lecture

Baxter Lecture Hall, 2 p.m.—“The Borderlands of Science: Where Sense Meets Nonsense,” Michael Shermer, publisher, *Skeptic* magazine. Donation is \$8 for nonmembers and \$5 for members and non-Caltech students. Free to the Caltech/JPL community. Tickets and information: 794-3119 or skepticmag@aol.com.

Caltech Y Decompression

Winnett quad, 7 to 11 p.m.—Prefinals fun-and-social drop-in. Information: 395-6163 or visit the Caltech Y at www.y.caltech.edu.

Monday, June 11

Baby Furniture and Household Equipment Pool

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Wednesday, June 13

Baby Furniture and Household Equipment Pool

234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Friday, June 15

107th Annual Commencement

Beckman Mall, 10 a.m.—The speaker will be Gordon E. Moore, PhD, chairman of the board of trustees, emeritus, Caltech, and chairman emeritus, Intel Corporation.

Saturday, June 16

Caltech Y Volunteer Project—Union Station

8 a.m. to 10 p.m.—Caltech Y volunteers will help prepare and serve meals for homeless men, women, and children at the Union Station shelter in Pasadena. Information: 395-3180, kabbott@caltech.edu, or www.y.caltech.edu/volunteer/.



They’re all real characters

What is reality, anyway? In the theater, as an audience watches the action on stage, what is most real—the audience, the characters in their created world, or the actors portraying them in “real life”?

In search of answers to these questions and more, Theater Arts at Caltech (TACIT) is presenting *Six Characters in Search of an Author* by the Italian Nobelist Luigi Pirandello. The TACIT cast is using an adaptation by Robert Brustein, which sets the play in contemporary Boston, and they have further adapted it to the Los Angeles–Pasadena area.

In the comedy, six characters, who have been stranded in an unfinished drama by their author, show up at a rehearsal of a Pirandello play and talk the director into enacting and finishing the script. In the course of the action, Pirandello explores the differences between the characters, the actors who try to portray them, and the “reality” that each of them experiences.

The idea of shattering the invisible “fourth wall” between the stage and audience was a startlingly new one in Pirandello’s time, said Shirley Marneus, director of TACIT. (According to one account, the play’s 1921 premiere in Rome was greeted with audience shouts of “Maricomio!”—“Madhouse!”)

In a prerehearsal interview next to Ramo Pond, Marneus explained that the playwright focused much of his work on the nature of reality and identity. Pointing out a crawdad hovering in the pond, she said it was a good analogy for what Pirandello does. “We plainly see the surface of the water,” she said. “That’s reality. But under the surface, the crawdads have their own reality. If I put my hand in the water, it shatters the surface tension and invades their reality.

“And when we come to the play, that’s the first reality,” Marneus continued. “The actors move around in that reality, but they also have their own reality. And in come characters, who invade the actors’ reality, and events that take place from different points of view. Pirandello shows many layers.”

Marneus has wanted to stage a Pirandello play for some time, because of the issues that he explores. “I want to push students to start dealing with these kinds of questions,” she said. “‘Who am I? How am I in the world? In relation to science, my work, my family?’ We all live in the here and now, and students here focus mainly on science. They’re used to the idea of many layers of reality in science, but I like to challenge them and broaden their experience in literature and in life.”

The *Six Characters* cast includes geophysics grad student Jane Dmochowski; seismo lab staff member Karen Kähler; physics/biology postdoc Hans-Michael Müller; and public relations staffer Doug Smith. The production continues on Fridays and Saturdays at 8 p.m. and Sundays at 2 p.m. through June 10 in Ramo Auditorium. For ticket information, call 395-4652 or 1 (888) 2CALTECH, e-mail events@caltech.edu, or visit the Public Events Web site at www.events.caltech.edu.

McCallan, from page 1

His luck held out. The Korean War was over and the fighting in Vietnam had not yet begun. McCallan was sent to Germany for two years of active duty. There he served in relative leisure, and the only conflicts he encountered were restricted to the soccer field. In 1960, he took a military leave to travel to Ireland and marry Caroline, the girl he had been dating before his American adventure. At the end of his service, the newlyweds moved to California.

Upon his return to Caltech, McCallan began his rise through the ranks, moving from lead man in the carpentry shop to assistant supervisor of shops to assistant manager of engineering and estimating. He became manager in 1979.

“My role is managing this office of 20 people, a mixture of architects, engineers, project managers, drafters, and clerical,” he said. “Our job is to assure that Caltech standards for construction are adhered to by outside architects, engineers, and contractors.”

During his tenure here, McCallan has been a witness to explosive growth. In his office, a framed 1948 aerial photograph shows that the campus proper sat on a thin strip of land that ran between Wilson and Hill. It was bounded by California Boulevard on the south, and San Pasqual on the north. A good two-thirds of the present-day campus stands on what was once a suburban developer’s dream tract.

“When I came here in 1956, the gross square footage of the campus was approximately 1.5 million square feet,” he said, referring to measurements taken from a structure’s outside wall to outside wall. “Today it’s 3.3 million square feet, above and below ground.”

McCallan has worked on many of these square feet, which amount to dozens of structures and the infrastructure to support them. His office also takes care of the modernization of labs, what he calls “the bread and butter” of his office.

Today, most of his energy is concentrated on the Broad Center going up on Wilson Avenue and the new fire station under construction on Del Mar. There are other projects in the planning stages, like the astrophysics building and the proposed Campus Center, which are in the fund-raising stage.

But these are ventures that McCallan doesn’t need to worry about. They will be inherited by his successor Christopher Wendrowski, who comes from L.A. County. Instead, McCallan will concentrate on the first big project on his retirement agenda. Come July, he and a few friends will explore the exotic golf courses of Ireland, visiting Portmarnock, Ballybunnion, and The Old Head of Kinsale.

“By then, I hope I’ll have adjusted to retirement,” he said.

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Honoring years of commitment and contributions to the Institute

Caltech’s 46th annual staff service awards ceremony will be held on Wednesday, June 6, at 10 a.m. in Beckman Auditorium. Presented by Human Resources, the program recognizes employees who have reached milestones of 10 or more years of service, at five-year intervals, at the Institute. A reception in the Beckman Institute courtyard will follow the ceremony, and friends, family, and colleagues are welcome to attend both the program and reception. Those especially long-serving staff members with 20 or more years will also be honored with a luncheon, hosted by Tom Schmitt, assistant vice president of human resources, at 11:45 a.m. in the Athenaeum Hall of Associates.

10 years

- Carlos Aguilar
- Glen Allbritton
- Kevin Austin
- Abelina Banuelos
- Rosavelia Banuelos
- Irma Black
- Aleen Boladian
- Robin Bolsey
- Dale Marlene Bolton
- Dian Buchness
- Lakshmi Bugga
- Lynn Burgess
- Jill Burnham
- Jorge Carrillo
- Atanasia Castillo
- Joseph Corrigan
- Harold Corwin Jr.
- Alicia Curiel
- Rachel Delgadillo
- Purnima Deshpande
- Angel Di Bilio
- Jose Diaz
- Tracey Evans
- Robert Flaker
- Helga Galvan
- Cherie Galvez
- Mary Gilmore
- Angela Goshorn
- Efrain Hernandez
- Mauro Hernandez
- John Hiroto
- Margot Hoyt
- Stanley Hudson
- Eloisa Imel
- Russell Jacobs
- Donald Jones
- Carrie Khim
- Virginia Licon
- Irene Loera
- JoAnne Mahan
- Kenneth Marsh
- David Mathog
- Michele May
- K. C. McBride
- Raul Mendez
- Stephen Miller
- Susan Montalvo
- Thanh Van Nguyen
- Virge Perdue Jr.
- Shady Peyvan
- Linda Powell
- Chris Quintanilla
- Alicia Rodriguez
- Rodney Rojas
- Trevor Roper
- Donna Sackett
- David Salazar
- Maureen Savage
- Juan Serna
- Janester Short
- Rebekah Sims
- Bernard Smith
- Betty Smith
- Rose Tashjian
- Phillip Trinh
- Lawrence Tudor
- Maria Villegas
- Benjamin Vital Jr.
- Kim West
- Harry Yohalem
- Heather Lynn Young
- Jina Yun

15 years

- Fernando Amador
- Tony Anderson
- Ramanuj Basu
- Deborah Bradbury
- Dennis Butler
- Anne Campbell
- Laura Cashion
- Eugene Castillo Jr.
- Sheryl Cobb
- Francisco Compean
- Jesus Cosio
- Joseph DeVito
- Julie Dinh
- Suzanne Dodd
- Ricardo Ebert
- Juan Garcia
- Jey Giuliano
- Jose Gonzalez
- Jose Gutierrez
- David Henderson III
- Linda Hermans-Killam
- LaSandra Hunter
- William Irwin
- Toni Itano
- Jeffery Douglas Jacobson
- Mehria Koshan
- Jay Labinger
- Kenneth Lewis
- Heidi Lorenz-Wirzba
- Karen McLaughlin
- Susan Mullins
- Renuka Nandkishore
- Nancy O’Connor
- James O’Donnell
- Stephen Padin
- Gravel Puente
- Rosa Robles
- William Rodriguez
- Yolanda Sandoval
- Margaret Sangiorgi
- Mark Stapf
- Silva Stepanian
- Kathleen Torres
- Marc Torres
- Gloria Vacio
- Eric Van De Velde
- Martina Villa
- Paul Ware
- Stanley Whitcomb
- Roy Williams

20 years

- Jesus Aguirre
- Carlzen Balagot
- Irene Baldon
- Robert Brucato
- Jeanette Butler
- Helen Carrier
- Raquel Carrillo
- Charlene Chindlund
- Walter Cook III
- Dana Cuney
- Elizabeth Ann Dryden
- Lidia Frias
- David Gardner
- Estela Gonzalez
- Thomas Gottschalk
- William Green
- Lynette Hein
- Timothy Heitzman

- Carlos Hinojosa
- Harry Hu
- Joanne Huffsmith
- Merry Keith
- Ronald Lawrence
- Jose Lopez-Tiana
- Michael Lum
- Andres Martinez
- Reza Ohadi
- Robert Padilla
- Stefon Ross
- Don Scott
- Susan Shaar
- Ernesto Thomas
- Greg Van Idsinga
- Saturnino Vasquez
- Deborah White

25 years

- Michael Bell
- Jerry Burk
- James Bys
- Paula DiConti
- Epaproditto Gelle
- Chris Harcourt
- Patrick Leahy
- Noel Nava
- Dolores Page
- Elsa Villate
- Clea Wright

30 years

- Suzette Cummings
- Calane Farmer
- Ramiro Garcia
- Jan Glaviano
- Dlorah Gonzales
- Larry Jones
- Edith Lenches
- Dorothy Lloyd
- Cecelia Manoochehri
- Gilberto Meraz
- Jane Rigg

35 years

- Guy Duremberg
- Booth Hartley
- William Lease
- Dana Roth
- Mary Webster
- Sophia Yen

40 years

- Joe Parker

45 years

- Mike McCallan

“Every day [at Caltech] is a new adventure.”
Dana Roth

“If you have a job that you like, stick to it.”
Guy Duremberg

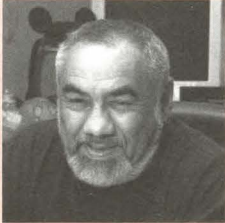
“Caltech provides a work environment that lets you excel at whatever you’re good at.”
Booth Hartley



Guy Duremberg
Chemistry Instrument Shop



Booth Hartley
SIRTF



Bill Lease
Behavioral Biology



Dana Roth
Caltech Library Systems



Mary Webster
Office of the President



Sophia Yen
Development



Joe Parker
Physical Plant Shops

Royal Society, from page 1

Specifically, the Royal Society cites Zewail’s work in the development of laser techniques and their applications to ultrafast dynamics of molecular systems. His contributions include femtochemistry, nonlinear spectroscopy, and molecular physics.

Zewail has conducted groundbreaking work in viewing and studying chemical reactions at the atomic level as they occur. Because reactions can take place in a millionth of a billionth of a second, his research has, with the use of advanced lasers, made it possible to observe, study, and predict this motion for the first time, thus allowing scientists to probe nature at its fundamental level. His work has had a significant impact on chemistry and related sciences worldwide. Born and raised in Egypt, and now a U.S. citizen, Zewail joined Caltech in 1976.

Shrinivas Kulkarni, the MacArthur Professor of Astronomy and Planetary Science, has also been elected to the Royal Society, as a Fellow. His revolutionary work in astrophysics was cited for contributing to fundamental astronomical discoveries that span a broad range of disciplines and include the fastest radio pulsar known, with a spin period of 1.5 ms; the first example of a brown dwarf star; white dwarf companions to binary pulsars; radio counterparts to soft gamma-ray repeating sources, and cosmological gamma-ray bursts.

Kulkarni’s discoveries and his recent work on the nature of gamma-ray bursts and their use in understanding the origins of the universe have had a major impact on astrophysics today. Born in India, and now a permanent U.S. resident, he joined the Caltech faculty in 1985.

David Baltimore, president of Caltech and a Nobel laureate himself, said, “Having two such distinguished professors receive this award is, indeed, an honor for Caltech, and is a testament to the caliber of faculty and scientists we have here at Caltech. Both of these eminent scholars have contributed to the advancement of science, and are most deserving of this illustrious honor.”

The Royal Society was established in England in 1660, and is the world’s oldest scientific academy in continuous existence. The society’s objectives are to recognize excellence in science; to support leading-edge scientific research and its applications; to stimulate international interaction; and to promote education and the public’s understanding of science.

Satellite, from page 1

The students gave a presentation to Caltech faculty members and researchers, JPL engineers, and a TRW engineer in Beckman Institute auditorium on May 24. They presented their mission design and displayed the satellite mock-up for inspection. The students, mostly juniors and seniors plus a few sophomores, come from economically disadvantaged homes, and are taking astronomy and chemistry classes taught by Lee Syer.

Bhatia, a postdoctoral scholar in observational cosmology, has advised the students on the technical and managerial aspects of the project, which was built at Littlerock High and in Caltech’s physics machine shop. Since October he has gone to the school about once a month, sometimes accompanied by postdoctoral scholar Brian Keating and physics machine shop supervisor Ricardo Paniagua. Bhatia also has arranged tours of JPL and the Owens Valley Radio Observatory for the students.

His goal was to give the students real-world problems and encourage them to discover solutions on their own, as opposed to lecturing to them. “I also wanted to show them some of the opportunities out there that they could pursue, and I wanted to encourage them to go to college,” he said.

Bhatia said it was difficult for the students to understand that he was a resource for the project but not the “answer man.” He said, “It is the first time that they have been in that kind of position.” The students also learned the importance of communication and teamwork. “Learning by participating and experiencing has been exciting, valuable, and productive for them.”

The students gained an understanding of the complexities of satellite telemetry, payload, and launch, as well as thermal, mechanical, and electrical design. They now have substantial experience in graphic design, editing, making presentations, and time management. “They’ve had to do so much work on this on top of all their other studies,” Bhatia said. “It has definitely inspired a lot of them to pursue their careers, whether it is in science or the arts. The main thing for me has been to see them grow in confidence and see what they really can create if given the opportunity and a little encouragement.”

Grant, from page 1

are manipulated at a lab bench. Now, students will leave campus and head out into the field, where they’ll learn how to properly take scientifically clean samples under varying environmental conditions. Then, back in the lab, they’ll be taught the current methodologies in metal, organic, and isotopic analysis.

Besides teaching, the Luce grant has two other equally important components. One is the establishment of a high-quality research platform for Caltech environmental scientists. Home for this part of the program will be the Kerckhoff Marine Biological Laboratory in Corona del Mar, at the mouth of Newport Bay. The lab has been maintained by the Division of Biology since 1930 and provides access to Southern California’s estuarine, coastal, and open-ocean waters. It will be modernized and upgraded for environmental science research with the latest standard and specialized analytical tools.

The other component of the program is research. Given its location, the Kerckhoff lab is ideally located to study a variety of research questions that pertain to the transformation from freshwater to ocean, to so-called “blue water” conditions further offshore, or to the specific differences between polluted and natural waters. Each undergraduate class will also take samples of local water conditions that will, over time, establish a permanent, baseline measurement for evaluating subtle changes in the Southern California marine environment.

Various research projects will be conducted at Kerckhoff as well with the help of students. Adkins, for example, wants to examine the supply of iron to the surface waters. It’s thought that, once absorbed, iron may limit the growth of plankton and therefore play an important role in the regulation of marine productivity. To study this, other researchers have had to artificially “fertilize” ocean waters with iron. But Southern California, says Adkins, has a natural experiment going on. “When the Santa Ana winds blow through the L.A. basin,” he says, “they carry iron-rich dust that falls into the ocean, especially in the San Pedro Basin. With Kerckhoff as our base, we’ll be able to measure the chemistry and the trace metals that fall before, during, and after a Santa Ana event. So we will have a natural, *in situ* experiment taking place on an ongoing basis.”

The Luce Foundation was established in 1936 by Henry R. Luce, the late co-founder and editor-in-chief of Time, Inc. With assets of about \$1.1 billion, the foundation focuses heavily on innovation and scholarship in higher education. Luce’s son, Henry Luce III, is the foundation’s chairman and CEO.

Switch, from page 1

cation known as “neddylation,” the physical attachment of a small protein, called NEDD8, to another protein. Neddylation is thought to alter the functioning of whatever protein NEDD8 attaches to. For example, when it attaches to the enzyme SCF (previously discovered by the Deshaies’s team), SCF activity increases dramatically. Although the enzymes that attach NEDD8 to proteins like SCF were already known, the enzymes that remove it were not.

Deshaies’s team discovered that CSN removes the NEDD8 that is attached to SCF. Based on this finding, they conclude that CSN controls the on-and-off switching of proteins. For example, when NEDD8 is not removed from its partners in plant cells, the plant doesn’t respond normally to hormones that control its development.

Many different physiological roles have been proposed for CSN, including roles in the synthesis of new proteins, control of cell division, and control of inflammation. The Deshaies team’s finding that CSN acts by removing NEDD8 from other proteins suggests that NEDD8, in turn, is likely to serve as a linchpin in these processes.

Deshaies and his laboratory colleagues are interested in the regulation of cell division, and in identifying the specific functions of various proteins within a cell that participate in this process. The proper regulation of cell division is critical for the normal development of organisms. In animals, aberrations in cell division can have profound consequences; unchecked cell division, for example, can lead to cancer.



Oh, poi
Contestants ready themselves for a poi-eating contest at a luau hosted by the Caltech Hawaiian Club. The luau was one of a number of events that took place during Caltech’s Asian Pacific Heritage Week celebration in May.