

# Caltech 336

T E S S M T W T F S S M T W

The campus community biweekly  
June 21, 2001, vol. 1, no. 12

## Crossing that bridge



Graduation candidates cross Millikan Pond for what might be the last time—and into the next phase of their lives—on their way to Caltech's 107th commencement ceremony. More photos, page 5.

## Casting light on neuron processes

Neuroscientists have long suspected that dendrites—the fine fibers that extend from neurons—can synthesize proteins. Now, using a molecule they constructed that “lights up” when synthesis occurs, Caltech biologist Erin Schuman and her colleagues have proven just that.

Schuman, an associate professor of biology and an assistant investigator with the Howard Hughes Medical Institute, and colleagues Girish Aakalu, Bryan Smith, Nhien Nguyen, and Changan Jiang, published their findings last month in the journal *Neuron*. Proving that protein synthesis does indeed occur in intact dendrites suggests that the dendrites may also have the capacity to adjust the strength of connections between neurons. That in turn implies they may influence vital neural activities such as learning and memory.

The research team constructed a so-called “reporter” molecule that, when introduced into neurons, emits a telltale glow if protein synthesis is occurring. “There was early evidence that protein-synthesis machinery was present in dendrites,” says Schuman. “Those findings were intriguing because they implied that dendrites had the capacity to make their own proteins.”

The idea that dendrites should be able to synthesize proteins made sense to Schuman  
*see Neurons, page 6*

## Brightest quasars linked with starbursts, gas

A team of scientists at Caltech and the State University of New York at Stony Brook has found strong evidence that high-luminosity quasar activity in galaxy nuclei—the centers of galaxies—is linked to high levels of interstellar gas and high rates of star formation.

In a presentation at the American Astronomical Society's summer meeting in Pasadena in June, Caltech's Nick Scoville and his colleagues reported that the brightest nearby optical quasar galaxies have massive reservoirs of interstellar gas much like the so-called ultraluminous infrared galaxies (ULIRGs). The quasar nucleus is powered by accretion into a massive black hole, while the infrared galaxies are powered by very rapid star formation. These ULIRG “starbursts” are believed to result from the high concentration of interstellar gas and dust in the galaxies' centers.

Scoville, the Moseley Professor of Astronomy, says, “Until now, it has been unclear how the starburst and quasar activities are related, since many optically bright quasars show only low levels of infrared emission, which is generally assumed to measure star formation activity.”

*see Quasars, page 5*

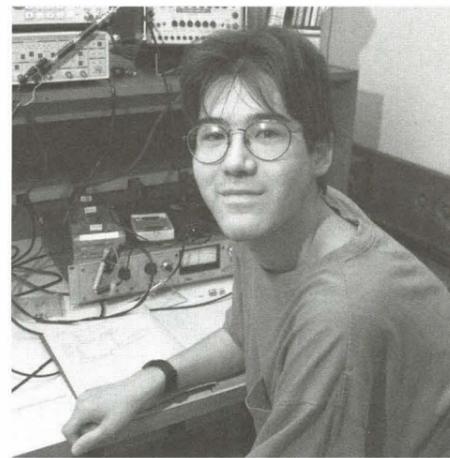
## Awards stack up for Caltech chemists

Out of 50 national awards recently presented by the American Chemical Society, six—count 'em, six—went to Caltech faculty members. The researchers were honored at the ACS's 221st meeting in San Diego for their numerous and diverse contributions to the field of chemistry.

John Baldeschwieler, Johnson Professor of Chemistry and Professor of Chemistry, Emeritus, received the ACS Award for Creative Innovation. His colleague John Roberts says that Baldeschwieler's “inventive contributions span an extraordinary range of scientific techniques. His work shows characteristic flair for creativity and originality, coupled with a pragmatic recognition of important practical applications.”

Harry Gray, Beckman Professor of Chemistry and director of the Beckman Institute, received the George C. Pimentel Award in Chemical Education. A Caltech colleague says that Gray's “influence on chemical education has been deep and profound through the students and teach-

*see Awards, page 2*



## Just 18, Caltech senior makes a big splash

When 18-year-old Chris Hirata packs away his Caltech diploma this month to enter Princeton's prestigious graduate physics program, some of his professors and associates on campus think he'll take with him much more than a likely 4.2 grade point average when the final grades are tallied.

Unlike other mathematics prodigies, who are often stereotyped as loners with no real peers, Hirata has been active socially and athletically—including as a member of the varsity swim team—since he arrived on campus at the age of 14. In fact, one of his prime goals was to avoid being stigmatized as the youngest kid in the group.

Hirata, a slim and athletic young man who looks and talks like a typical 18-year-old, has clearly been a standout among a student body of standouts. Upon arriving at Caltech in 1997, he earned one of the highest scores in history on the Institute's mathematics diagnostic tests, thereby foregoing freshman calculus and sophomore differential equations for a more difficult upper-division class. And his early mastery of physics, his chosen field, is even more impressive. On the Graduate Record Exam advanced subject test in physics, he scored a perfect 990.

Hirata has encountered few, if any, academic challenges he couldn't rise to during his four years at Caltech, which is famous for its notoriously tough undergraduate curriculum. But he especially prides himself on having been accepted as a peer and even as a leader by fellow students, despite his age.

“I can think of myself as being 18, or as a college senior,” says Hirata. “I prefer the latter.” Though he admittedly felt his age when he began college four years ago, he thinks he had pretty much overcome the stigma of being a young student by the time he was 16. Probably the most significant effect of his age, for a while, was on his varsity swimming performance. But he says he became more competitive toward the end of his undergraduate career.

And clearly almost everyone else on campus sees Hirata not just as an 18-year-  
*see Hirata, page 6*

## SURF is up

No sooner had the big red cannon's boom signaled the end of the spring term—and the beginning of summer break—than Caltech's Summer Undergraduate Research Fellowships program kicked into gear.

Known by the more manageable acronym SURF, the 10-week program is designed to introduce Caltech students and other undergraduates to the varied and rigorous world of scientific research.

“The coin of the realm here of course is research,” said Carolyn Merkel, who has served as SURF's director for some 20 years. In that time, she has helped mold SURF into an experience that serves the needs of two distinct groups. “Students who come to Caltech expect to get involved in research,” she said, “and Caltech faculty expect to work with students.”

Since the dawn of scientific inquiry, custom has dictated that researchers, in this case faculty members and their chosen grad students and postdocs, conduct the bulk of funded laboratory research. SURF is a rare and valuable opportunity for undergraduates to get an early taste of that kind of study.

SURF is designed to mimic the process that the modern scientist follows to receive National Science Foundation funding, which includes performing the investigation and publishing the results. Few colleges or universities can offer students the combination of hands-on experience and personal attention that they get through SURF.

*see SURF, page 6*

# NewsBriefs

## And to top it off...



The future Broad Center for the Biological Sciences celebrated its traditional "topping-off" on June 13. The top beam of the frame was signed by Institute trustee and benefactor Eli Broad, President David Baltimore, and other Caltech community members before being hoisted into place with a flag and evergreen tree.

## Honors and awards

**John Abelson**, Beadle Professor of Biology, has been elected to the American Philosophical Society, as a member of its biological sciences class. Founded by Benjamin Franklin over 250 years ago, the society promotes the sciences and humanities through scholarly research, professional meetings, publications, library resources, and community outreach.

**Paul Bellan**, professor of applied physics, has received one of two 2001 SPD Popular Writing Awards. Given each year to a professional scientist and to a science writer or journalist by the Solar Physics Division of the American Astronomical Society, the awards include \$500 cash and a certificate, and recognize the winning articles' relevance to solar physics, educational value, accuracy, and clarity of presentation, among other criteria. Bellan's article, "Simulating Solar Prominences in the Laboratory," appeared in *American Scientist*, volume 88, March/April 2000.

Recipients of the 2000-01 Graduate Student Council Teaching and Mentoring Awards are, for classroom teaching, **Hans Hornung**, Johnson Professor of Aeronautics and director of the Graduate Aeronautical Laboratories; **Julia Kornfield**, associate professor of chemical engineering and director of the Center for the Science and Engineering of Materials; and **Brian Stoltz**, assistant professor of chemistry; and, for mentoring, **Agustin Colussi**, senior research fellow in environmental engineering science, and **Brian Stoltz**. The teaching-assistant award has gone to **John Morgan**, graduate student in chemistry.

**Denise Nelson Nash**, director of public events, has been elected president of the Tournament of Roses Foundation, which as a nonprofit corporation has been managing charitable donations for the Tournament of Roses Association since 1993. A graduate of Scripps College, Nash has been at Caltech since 1998 and is noted for establishing its Cultural Expedition Program, which in collaboration with the Pasadena Unified School District has benefited more than 600 high school students annually.

**George Rossman**, professor of mineralogy, has been selected to receive the Mineralogical Society of America's Dana Medal. Established in 1998 and named in 2000 in honor of the contributions by James Dwight Dana and Edward Salisbury Dana to the science of mineralogy, the Dana Medal recognizes "continued outstanding scientific contributions through original research in the mineralogical sciences" by an individual in the midst of his or her career.

**Edward Stone**, Morrisroe Professor of Physics, has received NASA's Distinguished Service Medal. Director of the Jet Propulsion Laboratory from December 1990 to May 2001, he remains the Voyager project scientist and is the principal investigator for NASA's Advanced Composition Explorer science mission. Also receiving Distinguished Service Medals are **Larry Dumas**, who is retiring from JPL in July after having served as deputy director for nine years, and **Edward Caro**, who retired from JPL in September 2000 as chief engineer for the Shuttle Radar Topography Mission, after 43 years at the Laboratory.

**Alexander Varshavsky**, Smits Professor of Cell Biology, has been elected to the American Philosophical Society, as a member of its biological sciences class. Founded by Benjamin Franklin in 1743, the society is the oldest learned society in the United States devoted to the advancement of scientific and scholarly inquiry.

## Personals

### New positions

**Andrew Blain** will join Caltech on October 1 as an assistant professor of astronomy. A specialist in the detection and interpretation of observations of distant galaxies at submillimeter wavelengths, he received his BS in 1990, MS in 1991, and PhD in 1995, all from the University of Cambridge.

**Jed Buchwald** has been named Caltech's Doris and Henry Dreyfuss Professor of History, effective July 1. A historian of 19th- and early-20th-century physics, he has for the past eight years been director of the Dibner Institute for the History of Science at MIT. He received his BA from Princeton in 1971 and his MA and PhD from Harvard in 1973 and 1974, respectively.

**Anton Kapustin** will join Caltech on September 1 as an assistant professor of theoretical physics. A particle theorist, he received his MS from Moscow State University in 1993 and his PhD from Caltech in 1997. He has made a series of contributions to string theory.

**Randy Lakeman** has been appointed director of development services, a new position designed to enhance operations and services for Caltech's fund-raising efforts. He will provide leadership for prospect research, gift processing, and stewardship and donor events. Currently the director of development research at Stanford, he is vice president and president-elect of the Association for Professional Researchers for Advancement. His appointment is effective July 2.

**Wilhelm Schlag** will join Caltech on September 1 as an associate professor of mathematics. A graduate of the Technical University of Vienna (MS 1992), he received his PhD from Caltech in 1996. He works in the area of harmonic analysis.

## New faculty officers announced

Caltech's Officers of the Faculty announced that **Marianne Bronner-Fraser**, Billings Ruddock Professor of Biology, has been voted in as the newest faculty chair, and **Melany Hunt**, professor of mechanical engineering, has been selected as vice chair. Professor of Geography, Emeritus, **Ned Munger** was named as secretary, taking over from Professor of Physics, Emeritus, **Ward Whaling**, who stepped down after 16 years.

This year's election was noteworthy in two ways: Bronner-Fraser is the Institute's first female faculty chair, and the voting process was conducted online for the first time. The electronic ballot was set up by **Michael Alvarez**, associate professor of political science—who is currently working on the joint Caltech-MIT Voting Technology Project—and **Marionne Epalle**, communications specialist in Engineering and Applied Science.



## Making connections

**Sheryl Gorchow-Stuart** recently took over as Caltech's director of foundation relations, succeeding Meredith Roche, who retired in September. Gorchow-Stuart came to Caltech from Pitzer College in Claremont, where she served for nine years as an associate director of development, director of foundation and corporate relations, and director of advancement communications. She notes that the most important aspect of her job—helping to connect researchers with organizations that are potential sources of funding—is also the most fulfilling. "It's gratifying to work with faculty members, the president, and the provost in conveying the Institute's needs to foundations," she says.

## Caltech receives Beckman Scholars Program award

The Arnold and Mabel Beckman Foundation awarded Caltech \$105,600 to support and encourage research among exceptional undergraduates in biology, chemistry, and chemical engineering. Caltech was one of 14 institutions selected from hundreds of applicants to receive the Beckman Scholars Program award, which will support six students over a three-year period.

The program offers an outstanding opportunity for gifted undergraduate students to obtain in-depth laboratory research experience, collaborating closely with faculty mentors. Each Beckman Scholar will perform research part-time during one academic year and full-time over two summers, and will receive an award of \$17,600.

Arnold Beckman and his wife, Mabel Beckman, established their foundation in 1977 to support research in chemistry and the life sciences. Beckman, a former Caltech professor of chemistry, left in 1940 to work full-time at Beckman Instruments, Inc., the company he founded. He served as chair of Caltech's board of trustees from 1964 to 1974, when he was elected chairman emeritus, and has received many honors for his technical, business, and civic contributions, including the Caltech Distinguished Alumni Award and the Robert A. Millikan Medal for distinguished service to the Institute.



Clockwise from top left, David Tirrell, Harry Gray, John Baldeschwieler, Robert Grubbs, Michael Hoffmann, and John Roberts display their ACS awards.

## Awards, from page 1

ers he has inspired and his many textbooks at both the freshman and advanced levels."

Robert Grubbs, Atkins Professor of Chemistry, was awarded the Herbert C. Brown Award for Creative Research in Synthetic Methods. His research, focusing on the synthesis of metal complexes that serve as catalysts in organic reactions, has transformed the field of synthetic chemistry, says MIT's Timothy Swager, one of Grubbs's former students.

Michael Hoffmann, Irvine Professor of Environmental Science, received the ACS Award for Creative Advances in Environmental Science and Technology. His research in environmental chemistry, which "showed that the atmosphere must be understood as a multiphase medium" with a critical liquid phase, has been key in understanding the chemical processes involved in air pollution.

John Roberts, Institute Professor of Chemistry, Emeritus, was awarded the Nakanishi Prize for his work in physical organic chemistry and development of nuclear magnetic resonance, which has placed him "among the intellectual founders of modern quantitative bioorganic chemistry."

David Tirrell, McCollum-Corcoran Professor and professor and chair of chemistry and chemical engineering, received the ACS Award in Polymer Chemistry, for his research, particularly the creation of precisely engineered artificial proteins, which "pushes the frontiers of the interface of polymer science and biology."

## Keep it to the kiosks

Spring quarter and the end of the school year have brought the usual flurry of activity to Caltech, along with a proliferation of advertisements and notices being posted around campus. Unfortunately, these flyers are appearing on light poles, building exteriors, sidewalks, and just about everywhere except on the bulletin boards and kiosks designated for them. Physical Plant Director Bill Irwin says, "This practice presents an unappealing appearance to visitors, and detracts from the hard work performed by Physical Plant personnel in maintaining an attractive campus. In addition, the residue from the tape, glue, and chalk creates maintenance problems."

Irwin requests that, effective immediately, all notices and advertisements be placed only on designated kiosks and bulletin boards. Any postings found on poles, buildings, sidewalks, or other inappropriate surfaces will be removed. "On behalf of the administration and Physical Plant, thank you for your cooperation in helping to keep our campus beautiful," Irwin says.

the academic week at Caltech is a printed version of selected events from the online @Caltech calendar,

<http://atcaltech.caltech.edu/calendar/>. To publish events online, register as an event planner on the @Caltech calendar. If unable to submit electronically, please call (626) 395-3630. For further information or a schedule of deadlines, call (626) 395-3630, fax (626) 449-2159, write 336 Calendar, 1-71, California Institute of Technology, Pasadena, CA 91125, or e-mail [debbieb@caltech.edu](mailto:debbieb@caltech.edu).

# June 21–September 30, 2001

M T W T F S S

Events in roman type are open to the public

Events in italic type are open to the Caltech community only

## Thursday, June 21

### Thesis Seminar

24 Beckman Labs, 2 p.m.—“Eye Position Signals in Ventral Visual Cortex and the Sensory Set Hypothesis,” David Rosenbluth, graduate student in biology, Caltech.

### Informal Biology Seminar

24 Beckman Labs, 4 p.m.—“Near Death Experiences: Visions of a Dying Brain, or Visions of a New Science of Consciousness?”, Sam Parnia, M.D., clinical research fellow in the molecular biology of asthma, University of Southampton. Information: 395-2686 or [wchen@its.caltech.edu](mailto:wchen@its.caltech.edu).

### Von Kármán Lecture Series

Von Kármán Auditorium, JPL, 7 p.m.—“From Galileo to Gossamer: 400 Years of Telescope Technology,” Art B. Chmielewski, manager, Large Telescope Concepts Office, JPL; and Mark Dragovan, research scientist, JPL. Admission is free. Information: [www.jpl.nasa.gov/lecture/](http://www.jpl.nasa.gov/lecture/).

## Friday, June 22

### Von Kármán Lecture Series

Pasadena City College, 1570 E. Colorado, the Forum (south of Colorado on Bonnie), 7 p.m.—“From Galileo to Gossamer: 400 Years of Telescope Technology,” Art B. Chmielewski, manager, Large Telescope Concepts Office, JPL; and Mark Dragovan, research scientist, JPL. Admission is free. Information: [www.jpl.nasa.gov/lecture/](http://www.jpl.nasa.gov/lecture/).

## Wednesday, June 27

### SURF Noon Seminar Series

153 Noyes, Sturdivant Lecture Hall, noon—In this seminar series, members of the Caltech faculty or JPL staff will present an overview of their areas of research. Today’s title and speaker to be announced. Please bring your lunch.

### Computer Science Seminar

Beckman Institute auditorium, 4 p.m.—“The Legacy of Computer Science,” Gerald Jay Sussman, Matsushita Professor of Electrical Engineering, MIT. Refreshments, Beckman Institute courtyard, 3:45 p.m.

## Wednesday, July 4

### Independence Day Holiday

## Wednesday, July 11

### SURF Noon Seminar Series

153 Noyes, Sturdivant Lecture Hall, noon—In this seminar series, members of the Caltech faculty or JPL staff will present an overview of their areas of research. Today’s title and speaker to be announced. Please bring your lunch.

## Thursday, July 12

### Civil Engineering Seminar

206 Thomas, 4 p.m.—“Bayesian Updating of Structural Models Using Dynamic Data,” Lambros Katafygiotis, George W. Housner Visiting Associate Professor of Earthquake Engineering, Caltech. Refreshments, 210 Thomas, 3:45 p.m.

## Monday, July 16

### Thesis Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 10 a.m.—“Representing Tropospheric Aerosols and Their Climatic Effects in Global Models,” Peter Adams, graduate student in chemical engineering, Caltech.

## Wednesday, July 18

### SURF Noon Seminar Series

153 Noyes, Sturdivant Lecture Hall, noon—In this seminar series, members of the Caltech faculty or JPL staff will present an overview of their areas of research. Today’s title and speaker to be announced. Please bring your lunch.

## Thursday, July 19

### Von Kármán Lecture Series

Von Kármán Auditorium, JPL, 7 p.m.—“Mars Exploration: From the Vikings to the 21st Century.” Speaker to be announced, JPL. Admission is free. Information: [www.jpl.nasa.gov/lecture/](http://www.jpl.nasa.gov/lecture/).

## Friday, July 20

### Von Kármán Lecture Series

City College, 1570 E. Colorado, the Forum (south of Colorado on Bonnie), 7 p.m.—“Mars Exploration: From the Vikings to the 21st Century.” Speaker to be announced, JPL. Admission is free. Information: [www.jpl.nasa.gov/lecture/](http://www.jpl.nasa.gov/lecture/).

## Wednesday, July 25

### SURF Noon Seminar Series

153 Noyes, Sturdivant Lecture Hall, noon—In this seminar series, members of the Caltech faculty or JPL staff will present an overview of their areas of research. Today’s title and speaker to be announced. Please bring your lunch.

### Biochemistry Seminar

153 Noyes Laboratory, 4 p.m.—“Exploring RNA and Protein Sequence Space with Directed Evolution,” Jack W. Szostak, professor of genetics, Harvard Medical School, and the Alex Rich Distinguished Investigator, Massachusetts General Hospital.

## Wednesday, August 1

### SURF Noon Seminar Series

153 Noyes, Sturdivant Lecture Hall, noon—In this seminar series, members of the Caltech faculty or JPL staff will present an overview of their areas of research. Today’s title and speaker to be announced. Please bring your lunch.

## Wednesday, August 8

### SURF Noon Seminar Series

153 Noyes, Sturdivant Lecture Hall, noon—In this seminar series, members of the Caltech faculty or JPL staff will present an overview of their areas of research. Today’s title and speaker to be announced. Please bring your lunch.

## Thursday, August 30

### Von Kármán Lecture Series

Von Kármán Auditorium, JPL, 7 p.m.—“Earthquake Prediction: A Practical Approach to an Impossible Problem,” Lucile M. Jones, visiting research associate, Caltech, and scientist-in-charge for Southern California, U.S. Geological Survey. Admission is free. Information: [www.jpl.nasa.gov/lecture/](http://www.jpl.nasa.gov/lecture/).

## Friday, August 31

### Von Kármán Lecture Series

Pasadena City College, 1570 E. Colorado, the Forum (south of Colorado on Bonnie), 7 p.m.—“Earthquake Prediction: A Practical Approach to an Impossible Problem,” Lucile M. Jones, visiting research associate, Caltech, and scientist-in-charge for Southern California, U.S. Geological Survey. Admission is free. Information: [www.jpl.nasa.gov/lecture/](http://www.jpl.nasa.gov/lecture/).

## The savvy @Caltech Calendar user

The students have all left. The lecture halls and seminar rooms are silent. Along the Olive Walk, it seems that very little is going on at Caltech. But aren’t those the sounds of live country rock coming from Winnett Quad? And up the street at PCC a speaker from JPL is getting ready to hold a fascinating Von Kármán lecture. The Caltech bookstore is having a sidewalk sale, and an important book about human rights is going to be discussed by Caltech’s Amnesty International group at Border’s books.

Even in the hot months of summer, there are events to be attended—or missed. But without a *Caltech 336* calendar pinned on your wall, how will you ever find out what’s happening?

The savvy @Caltech Calendar user knows. The savvy user just logs on to <http://atcaltech.caltech.edu/calendar/>, where it is possible to view a detailed list of all the latest events, some posted just *moments* before. Because the online calendar is updated constantly, the savvy user need never miss an event.

Will YOU become a savvy user of our online calendar this summer?

# CampusEvents

## Thursday, June 21

### Camping and Hiking Trip to Centennial (Nelder) Grove

9 a.m. through Sunday, June 24, 5 p.m.—Sponsored by the Caltech Y, International Student Programs, and the Alumni Association. Interested students should contact the Caltech Y, 395-6163, or International Student Programs, 395-6330, for more information; alumni should direct their questions to the Alumni Association.

## Saturday, June 23

### Caltech/MIT Enterprise Forum

Baxter Lecture Hall, 8:30 a.m. to noon—"Venturing in Wireless and Mobile Technology: Separating Money from Mirage." The presenters and the panel of experts will offer their perspectives on the present and future of wireless and mobile technology to sort out the sustainable business opportunities for young, entrepreneurial businesses. Fee: \$40 general admission, \$10 for non-Caltech students, free for Caltech students, faculty, and staff. Registration, 395-3916. Information: <http://www.entforum.caltech.edu/>.

### Child Educational Center's 12th Annual Wine-Tasting Benefit

Avery House, 6:30 to 11 p.m.—An evening of fine wines, great food, live jazz, gaming, and unique items for auction. To benefit the nonprofit Child Educational Center. Fee: \$30 general admission, \$60 for connoisseur level, which includes premium wines. Tickets: 395-6161, (818) 354-3418, [hruppel@caltech.edu](mailto:hruppel@caltech.edu), or at the Caltech Bookstore or the Child Educational Center. Visit the CEC at [www.ceconline.org](http://www.ceconline.org).

## Monday, June 25

### 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. (Note: Open Monday and Wednesday all summer, except for Institute holidays.)

### Ballroom Dance Club

Dabney Lounge, 7:30 to 9 p.m.—An eight-week series of salsa lessons, professionally taught. No partner or experience required, and you may attend on a drop-in basis (material from previous lessons will be reviewed at each session). Fee: \$6 per lesson for Caltech students, \$8 per lesson for others. Information: 229-7508. Refreshments. (Note: Held every Monday through August 13.)

## Thursday, June 28

### Campus Architectural Tour

Athenaeum entry hall, 11 a.m. to 12:30 p.m.—Led by members of the Caltech Architectural Tour Service. Reservations: 395-6327 or [suze@caltech.edu](mailto:suze@caltech.edu).

### Amnesty International Group Meeting

1052 E. Del Mar Blvd. (top floor, GSC Penthouse), 7:30 to 9:30 p.m.—The Caltech/Pasadena chapter of Amnesty International will discuss new and on-going activities. Information: [lkamp@lively.jpl.nasa.gov](mailto:lkamp@lively.jpl.nasa.gov), (818) 354-4461, or [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml).

## Saturday, June 30

### New Installation at Caltech Art Space

Caltech Outdoor Art Space, 6 p.m. to 8 p.m.—An opening reception for a new installation by Los Angeles artist Norm Laich. The work is a billboard that explores the nature of rationality, time, and technological obsolescence and breakdown. Information: [mrogers@caltech.edu](mailto:mrogers@caltech.edu), [dustin@mop.caltech.edu](mailto:dustin@mop.caltech.edu), 395-6803, or 395-4248.

## Wednesday, July 4

### Independence Day Holiday

## Friday, July 6

### Caltech Environmental Task Force

Chandler Dining Hall, noon—Members of the Caltech community and interested public are welcome to discuss campus, community, and global environmental concerns. Look for the CETF sign on an outside table between Chandler and the Red Door.

## Tuesday, July 10

**Letter Writing With Amnesty International**  
Athenaeum Rathskellar, 7:30 to 9 p.m.—An informal meeting at which we write letters on human-rights actions sponsored by Amnesty International. A list of actions with full description and addresses will be available, as well as paper, envelopes, stamps, etc. Visit our Web site at [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml).

## Thursday, July 12

### Summer One-Day Blood Drive

Winnett lounge, 10 a.m. to 4 p.m.—Give the gift of life. Appointments, 395-6001 or [Diana.Alvarez@caltech.edu](mailto:Diana.Alvarez@caltech.edu). Walk-ins are welcome.

## Friday, July 13

### Falun Gong: The Real Story

101 Kerckhoff, 7:30 to 9:30 p.m.—Through video documentaries and discussion, learn about what Falun Gong is and why it is persecuted in China.

## Saturday, July 14

### Classic Car Club of America Western Grand Classic

Beckman Mall, 9:30 a.m. to 2:30 p.m.—Certified classics such as a Rolls Royce, Duesenbergs, Packards, Cords, and Bugattis will be on display. Also featured are cars built this year by Pasadena custom body shops and cars from the collections of Otis Chandler, J. B. Nethercutt, the Petersen Museum, Peter Mullin, and Jay Leno. Admission is free.

## Sunday, July 15

### Human-Rights Book Discussion Group

Border's Books on South Lake, near San Pasqual, in Pasadena, 7:30 p.m.—This month's selection is *Newjack: Guarding Sing Sing*, by Ted Conover. You are welcome to attend even if you haven't read the book. Visit our Web site at [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml).

## Thursday, July 26

### Amnesty International Group Meeting

1052 E. Del Mar Blvd. (top floor, GSC Penthouse), 7:30 to 9:30 p.m.—The Caltech/Pasadena chapter of Amnesty International will discuss new and on-going activities. Information: [lkamp@lively.jpl.nasa.gov](mailto:lkamp@lively.jpl.nasa.gov), (818) 354-4461, or [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml).

## Friday, July 27

### Folk Music Society Presents Danú

Dabney Lounge, 8 to 10:30 p.m.—Danú is an Irish music group made up of seven young male traditional musicians. Admission is \$15 for adults, \$4 for children and Caltech students. Tickets and information: 395-4652, 1 (888) 2CALTECH, or [events@caltech.edu](mailto:events@caltech.edu). Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at [www.events.caltech.edu](http://www.events.caltech.edu).

## Friday, August 3

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Chandler Dining Hall, noon—Members of the Caltech community and interested public are welcome to discuss campus, community, and global environmental concerns. Look for the CETF sign on an outside table between Chandler and the Red Door.

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## Sunday, August 19

### Human-Rights Book Discussion Group

Border's Books on South Lake, near San Pasqual, in Pasadena, 7:30 p.m.—A monthly discussion group devoted to books with topics related to human rights. This month's selection will be announced on our Web site, [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml). You are welcome to attend even if you haven't read the book.

## Thursday, August 23

### Amnesty International Group Meeting

1052 E. Del Mar Blvd. (top floor, GSC Penthouse), 7:30 to 9:30 p.m.—The Caltech/Pasadena chapter of Amnesty International will discuss new and on-going activities. Information: [lkamp@lively.jpl.nasa.gov](mailto:lkamp@lively.jpl.nasa.gov), (818) 354-4461, or [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml).

## Monday, September 3

### Labor Day Holiday

## Friday, September 7

### Caltech Environmental Task Force

Chandler Dining Hall, noon—Members of the Caltech community and interested public are welcome to discuss campus, community, and global environmental concerns. Look for the CETF sign on an outside table between Chandler and the Red Door.

### Falun Gong: The Real Story

101 Kerckhoff, 7:30 to 9:30 p.m.—Through video documentaries and discussion, learn about what Falun Gong is and why it is persecuted in China.

## Saturday, September 8

### Folk Music Society Presents the Cache Valley Drifters

Dabney Lounge, 8 to 10:30 p.m.—Bluegrass music. Admission is \$12 for adults and \$4 for children and Caltech students. Tickets and information: 395-4652, 1 (888) 2CALTECH, or [events@caltech.edu](mailto:events@caltech.edu). Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at [www.events.caltech.edu](http://www.events.caltech.edu).

## Tuesday, September 11

### Letter Writing With Amnesty International

Athenaeum Rathskellar, 7:30 to 9 p.m.—An informal meeting at which we write letters on human-rights actions sponsored by Amnesty International. A list of actions with full description and addresses will be available, as well as paper, envelopes, stamps, etc. Visit our Web site at [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml).

## Sunday, September 16

### Human-Rights Book Discussion Group

Border's Books on South Lake, near San Pasqual, in Pasadena, 7:30 p.m.—A monthly discussion group devoted to books with topics related to human rights. This month's selection will be announced on our Web site, [www.its.caltech.edu/~aigp22/home.shtml](http://www.its.caltech.edu/~aigp22/home.shtml). You are welcome to attend even if you haven't read the book.

## Saturday, September 22

### Caltech/MIT Enterprise Forum

Baxter Lecture Hall, 7:30 a.m. to 12:30 p.m.—Topic and speaker to be announced. Fee: \$40 general admission, \$10 for non-Caltech students, free for Caltech students, faculty, and staff. Registration: 395-3916 or [ircshare@caltech.edu](mailto:ircshare@caltech.edu). Information: [www.entforum.caltech.edu](http://www.entforum.caltech.edu).

### Folk Music Society Presents Eileen McGann

Dabney Lounge, 8 to 10:30 p.m.—McGann is a Canadian singer-songwriter. Admission is \$12 for adults, \$4 for children and Caltech students. Tickets and information: 395-4652, 1 (888) 2CALTECH, or [events@caltech.edu](mailto:events@caltech.edu). Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at [www.events.caltech.edu](http://www.events.caltech.edu).

## Science writers converge on Caltech

For the third summer in a row, journalists from such far-flung places as Indianapolis, Toronto, and Chennai (Madras), India, will gather on campus for the Jack R. Howard Science Reporting Institute.

The conference, which will take place June 25–30, is jointly presented by Caltech and the Pasadena-based Foundation for American Communications (FACS), and is funded by the Scripps Howard Foundation. Its goal is to improve the quality of science and technology reporting by enhancing mutual understanding between scientists and journalists.

The 25 fellows at this year's institute will attend a variety of interactive sessions, including lab tours, writing exercises, and seminars and talks on a variety of topics with Caltech's Michael Alvarez, David Anderson, David Goodstein, Marc Kamionkowski, Steve Koonin, Gary Lorden, Bruce Murray, Barry Simon, and Barbara Wold. Other speakers will be USGS seismologist Lucy Jones; JPL engineering principal Ralph Miles; and FACS senior vice president Randy Reddick.

The Institute honors Jack Howard, former president of the Scripps Howard Broadcasting Company and of the Scripps Howard Foundation, whose goal is to support excellence in journalism. FACS is a nonprofit organization dedicated to improving the quality of journalism through sponsoring educational conferences for reporters.

## Letter to the editor

Dear 336 Editor:

A minor factual error in John Sutherland's "Guerilla Parking" article (Caltech 336, May 17, 2001) raises a subject of interest to historical-minded members of the Caltech community.

The structure on Holladay Road referred to as George Ellery Hale's house was actually his solar observatory. The house on the property was built in the 1980s by Christine and the late Jack Shirley, members of the Caltech Associates, who bought the lot and the building housing the observatory from the Carnegie Observatories.

Christine, who has a keen interest in both Caltech and California history, took great care to preserve the site, deliberately setting her new house along the west side of the lot so as not to block the view of the observatory from the street.

She got hold of Beatrix Farrand's original landscaping plans for the garden (Farrand, wife of the director of the Huntington Library in the late 1920s, was involved with the landscape design for Caltech; more information about her can be found in Romy Wyllie's book *Caltech's Architectural Heritage*) and planted the yard with careful reference to the plans, including the mock orange trees flanking the door of the house. Over a period of years, with the volunteer help of Caltech students, Christine even restored some of the original observatory equipment.

Emily Adelsohn

## 336 takes a breather

**This issue of *Caltech 336* will be the last one for the academic year. The publication will go on hiatus until September, near the beginning of fall term. So until then, enjoy the summer and keep cool, and we'll look forward to seeing you again in a few months.**

### Quasars, from page 1

"The discovery that quasars inhabit gas-rich galaxies goes a long way toward explaining a longstanding problem," Scoville says. "The number of quasars has been observed to increase very strongly from the present back to Redshift 2, at which time the number of quasars was at a maximum.

"The higher number of quasars seen when the universe was younger can now be explained, since a larger fraction of the galaxies at that time had abundant interstellar gas reservoirs. At later times, much of this gas has been used up in forming stars. In addition, the rate of merging galaxies was probably much higher, since the universe was smaller and galaxies were closer together."

The new study shows that even optically bright quasar-type galaxies (QSOs) have massive reservoirs of interstellar gas, even without strong infrared emission from the dust clouds associated with star formation activity. Thus, the fueling of the central black hole in the quasars is strongly associated with the presence of a large interstellar gas supply.

The Scoville team used the millimeter-wave radio telescope array at Caltech's Owens Valley Radio Observatory near Bishop, California, in a search for carbon monoxide (CO) molecule emissions in the 12 nearest and brightest optical quasars.

In the sample, eight of the 12 quasars had detectable CO emissions—implying huge masses of interstellar molecular clouds up to five times the size of those in the Milky Way galaxy. Such large gas masses are found only in gas-rich spiral or colliding galaxies. The present study clearly shows that most quasars are also in gas-rich spiral or interacting galaxies, not in gas-poor elliptical galaxies as previously thought.

The new study supports the hypothesis of an evolutionary link between the two brightest classes of galaxies: merging ultraluminous infrared galaxies and ultraviolet/optically bright QSOs. Both the ULIRGs and QSOs show evidence of a recent galactic collision.

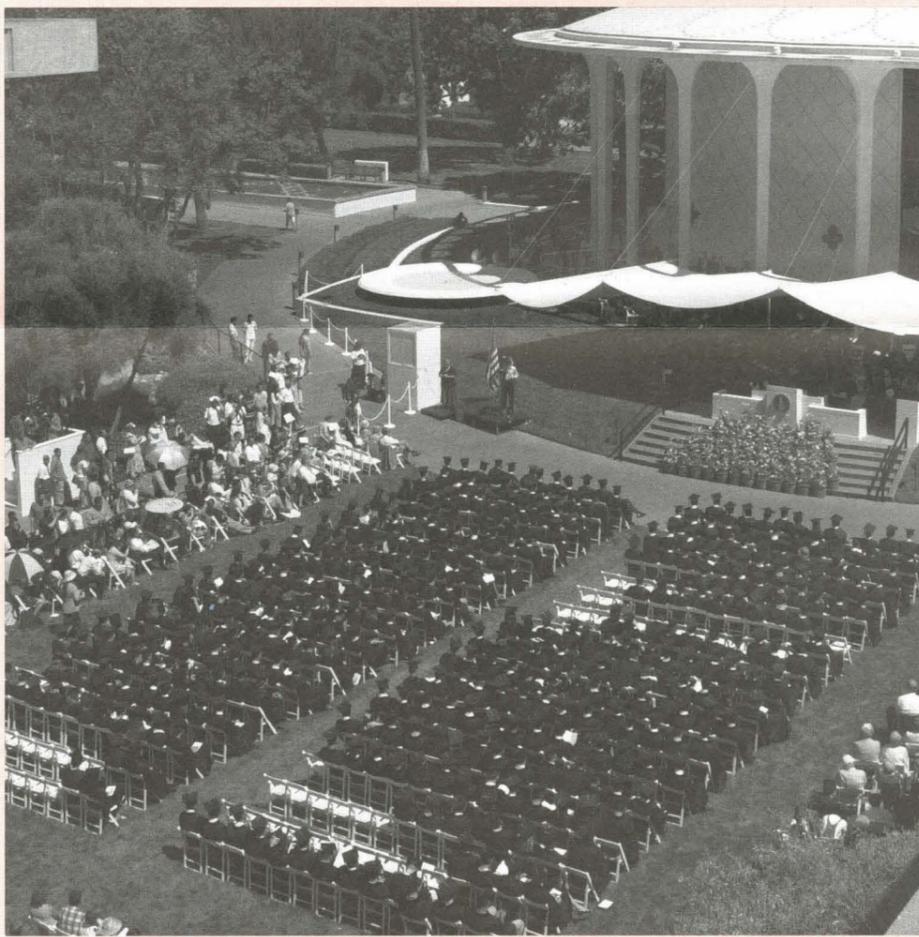
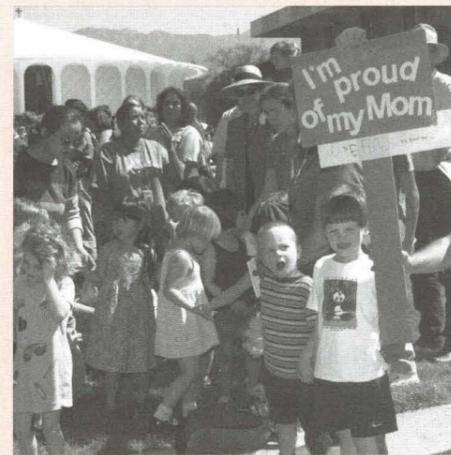
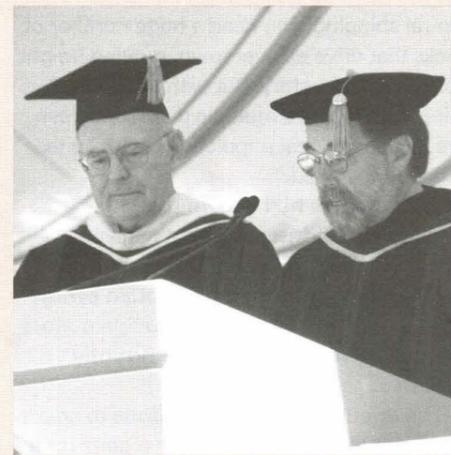
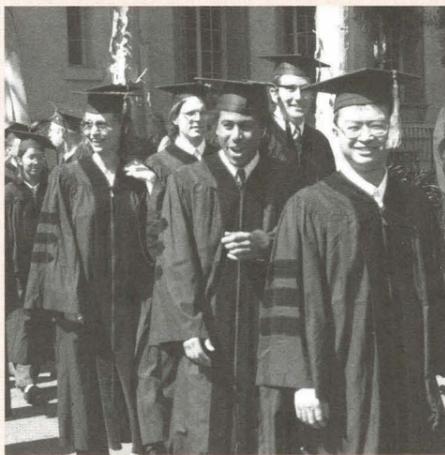
The infrared luminous galaxies are most often powered by prodigious starbursts in their galactic centers, forming young stars at 100 to 1,000 times the current rate of the entire Milky Way. The quasars are powered by matter that accrues into a massive black hole at each quasar's nucleus at a rate of one to 10 solar masses per year. The detection of abundant interstellar gas in the optically selected QSOs suggests a link between these two very different forms of galactic nuclear activity: the same abundant interstellar gases needed to form stars at a high rate might also feed the central black holes.

The discovery of molecular gas in the optically selected QSOs that do not have strong infrared emissions suggests that the QSO host galaxies might be similar systems observed at a later time after the starburst activity has subsided, yet with their black holes still being fed by interstellar gas.

For the remaining four quasars where CO was not found, improved future instruments with greater sensitivity may well detect molecular gas, Scoville says. Even in the detected galaxies the CO emissions were extremely faint due to the galaxies' great distances—typically over a billion light-years.

Other members of the team are David Frayer and Eva Schinnerer, both research scientists at Caltech, Caltech graduate students Micol Christopher and Naveen Reddy, and Aaron Evans at SUNY, Stony Brook.

## "Stay low, and be confident"



Clockwise from top left: Degree candidates march in; absorb words of wisdom from speaker Gordon Moore (with President David Baltimore at right); are lauded by friends and family; and enjoy their moment in the sun; meanwhile, audience members seek shelter from the limelight.

Keynote speaker Gordon Moore, PhD '54, spoke those words of advice—equally applicable for snowboarders and for the sun-drenched graduates at Caltech's June 15 commencement ceremony.

Moore, the chair emeritus of Caltech's board of trustees and of Intel Corporation, encouraged the newly minted graduates to stay "close to the data" and to be confident and "proactive" as they advance their opinions throughout their careers. He commented that grads would likely experience several career changes. But "the basics of what you've learned here," including learning how to learn, "will carry you a long way."

The veteran Techer and Caltech commencement speaker addressed the crowd comfortably and confidently, mixing nostalgia and prediction and marveling over some of the huge advancements in knowledge that have occurred in his lifetime.

The cofounder of Intel—creators of the computer microprocessor—Moore is the originator of Moore's Law, a prediction that the chip's computing power would double every two years. In introducing him to the crowd, fellow alum Ben Rosen '54, who currently chairs the board of trustees, noted that history counts the microprocessor as "one of the top inventions," right up there with the light bulb, telephone, and airplane.

Before Moore could take the podium, however, Caltech's Ecphonema a cappella group piped in with their rendition of "Weird Al" Yankovic's "It's All About the Pentiums"—a fitting tribute to a man who helped usher in the current computer age.

*The data: 484 graduates—204 BS degrees; 120 MS degrees; 1 Engineer degree; 159 PhD degrees. Commencement 2001 can be viewed on the Web at <http://pr.caltech.edu/commencement/01/index.html>.*

**Neurons**, from page 1

and others because it was more efficient. "It's like the difference between centralized and distributed freight shipping," she says. "With central shipping, you need a huge number of trucks that drive all over town, moving freight from a central factory. But with distributed shipping, you have multiple distribution centers that serve local populations, with far less transport involved."

Prior studies had shown that, in test tubes, tiny dendrite fragments still could synthesize proteins. Schuman's team believed that visualizing local protein synthesis in living neurons would provide a more compelling picture than was currently available.

The scientists began their efforts to create a reporter molecule by flanking a gene for a green fluorescent protein with two segments of another gene for a particular enzyme. Doing this ensured that the researchers would target the messenger RNA (mRNA) for their reporter molecule to dendrites.

Next, in a series of experiments, the group inserted the reporter molecule into rat neurons in culture and then triggered protein synthesis using a growth factor called BDNF. By imaging the neurons over time, the investigators showed that the green fluorescent protein was expressed in the dendrites following BDNF treatment—proof that protein synthesis was taking place. The researchers also showed they could cause the fluorescence to disappear by treating the neurons with a drug that blocked protein synthesis.

Schuman and her colleagues also addressed whether proteins synthesized in the main cell body, called the soma, could have diffused to the dendrites, rather than the dendrites themselves performing the protein synthesis. The researchers proved the proteins weren't coming from the soma by simply snipping the dendrites from the neurons, while maintaining their connection to their synaptic partners. Sure enough, the isolated dendrites still exhibited protein synthesis.

Intriguingly, Schuman notes, hot spots of protein synthesis were observed within the dendrites. By tracking the location of the fluorescent signal over time, the team could see that these hot spots waxed and waned consistently in the same place. "The main attraction of local protein synthesis is that it could endow synapses with the capacity to make synapse-specific changes, which is a key property of information-storing systems," she says. "The observation of such hot spots suggests there are localized areas of protein synthesis near synapses that may provide new proteins to synapses nearby."

The researchers are now applying their reporter molecule system to more complex brain slices and whole mice. "In the whole animals, we're exploring the role of dendritic protein synthesis in information processing and animal learning and behavior," says Schuman.

**Hirata**, from page 1

old, but as a gifted and accomplished graduating student. In terms of social maturity and leadership ability, Professor of Planetary Science and Geology, Emeritus, Bruce Murray thinks Hirata is an exceptional Caltech product.

"He's an extraordinary young man, of whom we are very proud," says Murray, a former JPL director who cofounded the Planetary Society with Carl Sagan and Louis Friedman. "Most students here consider him the unquestioned expert in physics, mathematics . . . almost anything else he talks about. He's the one who other students just assume will know the answer."

Murray got to know Hirata through the campus Mars Society, of which Murray is the faculty adviser. The society works on various projects associated with the exploration of Mars, but is particularly interested in helping pave the way for the human exploration of Mars, Murray says.

Fellow Mars Society member and friend Derek Shannon says he has been impressed by Hirata's diligent work toward that end. "He's quite a bit different from a lot of Caltech geniuses I know in that he really has a selfless motivation to make space exploration happen," says Shannon, a Caltech junior.

Markus Keel, Todd Instructor in Mathematics, is also impressed with Hirata's combination of ability and maturity. "He does not come across as a pain-in-the-ass Doogie Howser type," says Keel, who taught Hirata differential geometry two years ago.

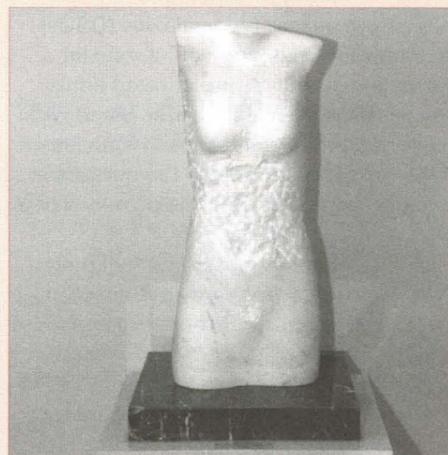
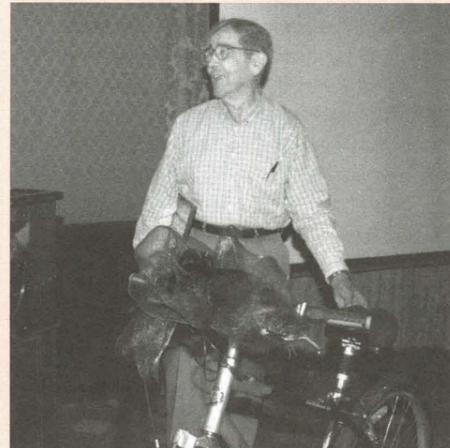
Keel's favorite anecdote about Hirata concerns a difficult problem on the final exam. Before putting the problem on the test, Keel had consulted two colleagues. One said he didn't see right away how to solve the exercise, while the other said that he didn't even believe the conclusion of the problem. Hirata not only solved the problem as Keel had framed it, but wrote that he knew of an easier way, and included that solution on the back of the exam.

"He's the strongest undergraduate I've ever encountered, either in my personal experience at the University of Chicago or in the years I've taught at Princeton, UCLA, and Caltech," Keel says.

Peter Goldreich, DuBridge Professor of Astrophysics and Planetary Physics, has a similar assessment of Hirata's performance in his planetary dynamics class. "He's a terrific student," says Goldreich. "He was the best in the class, even though it was a graduate course and he was the only undergraduate."

David Baltimore, president of Caltech, notes that Hirata's parents have also been integral to his success. "We rarely encounter a scholar so young who is able to take advantage of Caltech," says Baltimore. "It is a credit both to Chris's brilliance and to his parents' commitment that he could be so successful."

# NewsExtras



Recent campus happenings include, clockwise from top left, a welcoming reception for Bill Davis, the new chief executive officer of KPCC/Southern California Public Radio, on June 8 at the Athenaeum; the surprise presentation of a new bicycle and digital camera to Professor of Physics, Emeritus, Ward Whaling, in appreciation of his 16 years of service as secretary of the Officers of the Faculty; the installation of *Ostrakon XVI*, a marble sculpture by the California artist Manuel Neri, in the third floor hallway of the Parsons-Gates administration building. The artwork is the gift of Ben Rosen, chairman of Caltech's board of trustees.

**SURF**, from page 1

"Students collaborate with a faculty member, either at Caltech or JPL, to define and develop a project," Merkel said. "Then the student writes a proposal for the work he or she wants to do. The proposals are reviewed by the faculty committee, and awards are made on the basis of reviewer recommendations."

The nature of the program ensures that every SURFer's experience will be different.

"Lloyd French always has a big group of students," Merkel said of the JPL scientist. "It's a team and he treats it like a group planning a space mission. But typically mentors work with one, two, or three students."

At summer's end, the students must submit a technical paper describing their work. This is accompanied by an oral presentation made in front of their fellow SURFers and mentors. According to Merkel, this focus on publication and presentation is central to SURF's aim, as it is to the aim of scientific research.

"Communication is just key to doing science," she said. "Science not communicated is science not done." The SURFers' completed papers are submitted to the editors of the *Caltech Undergraduate Research Journal*, who consider them for publication. *CURJ* is a new peri-

odical that is published and edited entirely by Caltech students.

Caltech students comprise the core group of the 348 SURFers, but many come from outside universities and other nations. This year, the program attracted 136 participants who are part of the Minority Undergraduate Research Fellowships program, as well as 36 international students. The latter hail from 15 countries, including Pakistan, Turkey, and the Philippines. In addition, 25 Caltech students will perform their SURF at universities like MIT, UC Irvine, and Stanford, while two will do theirs in Australia and Israel.

At Caltech, Merkel and crew, including Carol Casey, Cheryl Gause, and Ryan Tischler, have planned activities to make this summer rewarding. The Career Center will bring in recent Institute graduates to present professional development workshops and stories about life in the real world. Every Wednesday at noon, members of the Caltech faculty or JPL staff will present seminars at Sturdivant Lecture Hall giving an overview of their areas of research. These seminars are free and open to the public.

# Caltech 336

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