

Congressman James Rogan, center, inspects an advanced technology prototype rover for the Mars 2003/2005 sample return missions as Dr. Paul Schenker, manager of the Exploration Technology Rover task, right, describes it and JPL Director Dr. Edward Stone looks on.

BOB BROWN / JPL PHOTO LAB

Rogan visit reaffirms budget support

By MARK WHALEN

Congressman James Rogan, whose recent efforts helped restore \$400 million for space science programs to NASA's budget for fiscal year 2000, visited JPL Aug. 10 to see first-hand some of the Lab's missions that will potentially be saved.

The Glendale Republican, whose district includes JPL, late last month persuaded the House Appropriations Subcommittee chairman to restore the funds following an initial vote to cut \$1.3 billion from NASA's budget. Following that, the full House Appropriations Committee voted to restore the \$400 million, including funding for the Space Infrared Telescope Facility (SIRTF), Europa Orbiter and Mars sample return missions.

The NASA budget "is not a Republican or Democratic issue, it's a science vs. anti-science issue," Rogan said, adding, "I would feel the

same way even if JPL were not in my district."

Rogan said his ongoing support for JPL includes visits here every few months to assess mission and technology development.

"Every time I come here, I see new technologies that have been developed not just for space exploration, but also the incredible spinoffs to the high-tech industry—not just for our economic corridor, but for California and the entire nation," he said. "This is a national resource."

Laboratory Director Dr. Edward Stone thanked Rogan for his action on behalf of JPL and NASA. "There's a real appreciation here for everything you've done to help restore the budget," Stone told the congressman. "It's really helped morale here at the Laboratory."

SIRTF Program Manager Larry Simmons told Rogan about the project's "de-evolution," in which the spacecraft's launch mass, liquid helium volume and lifecycle cost have been drastically reduced

from its original design in 1990. SIRTF Project Scientist Dr. Michael Werner described the mission's science goals to Rogan, and Dr. Michelle Thaller demonstrated the concepts of temperature and infrared radiation. SIRTF is due for launch in December 2001 on a five-year mission.

Dr. Richard Zurek, project scientist for the Mars Surveyor '98 missions, described the Mars Polar Lander mission to the congressman, noting that the primary site for the spacecraft's Dec. 3, 1999 landing will soon be selected. Zurek also discussed Mars Climate Orbiter, which will serve as a relay satellite for the Polar Lander before beginning a mission of one Mars year to map seasonal changes of the Martian climate. This spacecraft will enter Mars orbit on Sept. 23.

Rogan also heard from Mars 2003/2005 Project Manager Bill O'Neil, who described the missions as the first round trip to another plan-

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Cassini streaks by Earth

By MARY BETH MURRILL

Earthlings bid farewell to the Cassini/Huygens spacecraft Aug. 17 as the Saturn-bound mission successfully completed a highly accurate pass of Earth at 8:28 p.m. Pacific Daylight Time (03:28 Universal Time Aug. 18). The flyby gave Cassini a 5.5-kilometer-per-second (about 12,000-mph) boost in speed, sending the spacecraft on toward the ringed planet more than 1 billion kilometers (almost 1 billion miles) away.

Engineers at JPL confirmed that the spacecraft flew past Earth as planned at an altitude of about 1,171 kilometers (727 miles), passing most closely above the eastern South Pacific at -23.5 degrees latitude and 231.5 degrees longitude. Cassini may have been visible

from small islands in that area, such as Pitcairn Island or Easter Island.

The spacecraft remains in excellent health as it continues along its seven-year journey to Saturn. Having completed its cruise among the inner planets, Cassini's future now resides in the cold, dark realm of the outer planets. The spacecraft will pass by Jupiter on Dec. 30, 2000; the giant planet's gravity will bend Cassini's

flight path to put it on course for arrival into orbit around Saturn on July 1, 2004.

During the Earth flyby, nine of Cassini's 12 science instruments were turned on to make observations of the Earth/Moon system. Scientific and engineering data from the Earth flyby will be transmitted by Cassini to receiving stations of the Deep Space Network over the coming days. □

SRTM launch delayed 'til Oct.

Launch of the Shuttle Radar Topography Mission (SRTM), an international project managed by JPL for the National Imagery and Mapping Agency and NASA, has been delayed until early October.

Originally scheduled for launch in September aboard Space Shuttle Endeavour, SRTM was removed from Endeavour's cargo bay so that inspections may be made of that vehicle's electrical harnesses. Transfer from Kennedy Space Center's Orbiter Processing Facility to the Vehicle Assembly Building has been postponed and launch is now scheduled for Oct. 7.

SRTM, which will utilize C-band and X-band interferometric synthetic aperture radars during its 11-day mission, represents a breakthrough in the science of remote sensing, and will produce topographic maps of Earth 30 times as precise as the best maps in use today. The information will produce the most comprehensive and accurate geographical map of Earth ever assembled. □

NOVA winners announced

The winners of JPL's Notable Organizational Value-Added (NOVA) awards for July have been announced:

Section 190: Izeller Cureton-Snead, Tania Geddes.

Section 194: Michael Chilicki, Mae Hawk, Nancy Kapell, Diana Lanagan, Marge Marquez.

Section 195: Maria Acevedo, Jeanie Hascher, Maria Raygoza.

Section 197: Rick Roessler.

Section 214: Jennifer Berlien.

Section 220: Elaine Evans, William Jensen, Marc Montgomery, Audrey Ridley, Christina Ruiz, James Tu, Aram Yabubian, Ida Young.

Section 222: Peter Lin, Haiyan Wang.

Section 224: David Fu, Jienming Jou, Binh Pham.

Section 230: Katrina Evans.

Section 234: Carol Fisher.

Section 236: Yvonne Bornhauser, Cynthia Rowland.

Section 311: Stuart Kerridge, Nancy Leon, Philip Richard Turner, Mark Vincent, John West.

Section 313: Dennis Potts, Donald Rocky.

Section 314: Susan Barry, Stephen Booth, Sheila Chatterjee, Roger Crowe.

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Special Events Calendar

Ongoing

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. Call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the fourth Tuesday of the month at noon. Call Jayne Dutra at ext. 4-6400.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. Call (626) 397-3110.

Friday, August 20

Von Kármán Lecture Series—Cassini science advisor Dr. Ellis Miner will present "Voyage to the Ringed Giant: Cassini Spacecraft Completes Two Years of Its Seven-Year Journey to Saturn." At 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd.

Wednesday, August 25

JPL Drama Club—Meeting at noon in Building 301-127.

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. For more information, contact Mary Sue O'Brien at ext. 4-5090.

Thursday, August 26

JPL Golf Club—Meeting at noon in Building 306-302.

Social Security—Representative

Ann Villeroy will be available in the Building 167 cafeteria from 9 to 11 a.m. Employees can request a personal earnings and benefits statement and ask general questions.

"What Every Secretary Should Know Before Pursuing an Administrator or Office Manager Position"—Panelists will discuss the positions of office manager, project scheduler, budgeter and assistant to a top executive at JPL. Issues also include the difference between working as a secretary and an administrator. Panelists represent a cross-section of Laboratory divisions for a broad perspective of today's administrative job duties. Moderator will be Alice Fairhurst, career development coordinator. Sponsored by the Director's Advisory Council for Women. At noon in von Kármán Auditorium.

Friday, August 27

JPL Dance Club—Meeting at noon in Building 300-217.

Wednesday, September 1

Associated Retirees of JPL/Caltech Board—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

JPL Drama Club—Meeting at noon in Building 301-127.

Thursday, September 2

JPL Gun Club—Meeting at noon in Building 183-328.

Friday, September 3

JPL Dance Club—Meeting at noon in Building 300-217.

JPL Perl Users Group—Meeting at noon in Building 301-127.

NOVA Vouchers Expire—ERC vouchers that were received as part of a NOVA award will expire today. For questions, call the Reward & Recognition Program Office at ext. 4-1612.

SeaWinds clocks hurricanes' wind speeds

By DIANE AINSWORTH

Snapshots of the velocity of storms, typhoons and cyclones as they are born, or icebergs the size of Rhode Island on the move, are beginning to add a new level of detail unprecedented in weather forecasting before now, thanks to JPL's new SeaWinds orbiting radar instrument.

Among its first science targets was Hurricane Dora, which hit the eastern tropical Pacific Ocean last week, clocking winds speeds of nearly 40 meters (90 mph) when SeaWinds recorded its fury, and Typhoon Olga as it grew in intensity and unleashed torrential rains over South and North Korea earlier this month.

The new SeaWinds instrument has begun generating daily global maps of wind speeds and directions over Earth's seas and is helping scientists to understand the effects of polar ice sheets on the planet's cli-

mate system. The instrument has been tracking the path of one iceberg recently, called B10A, which broke off the end of the Thwaites glacier in western Antarctica in July and has been obstructing shipping lanes in the ocean between South America and Antarctica.

"In addition to its primary role of measuring oceanic winds, this spaceborne radar sensor is uniquely well-suited for mapping the polar regions because it can see through clouds during the day and night," said Dr. David Long of Brigham Young University, Utah, who is a member of the SeaWinds science team. "SeaWinds found B10A after it broke off of the Thwaites glacier and disappeared in July. We found it in the Drake Passage between Tierra del Fuego at the southern tip of South America and the Antarctic Peninsula, and reported its whereabouts to the National Ice Center, which is tracking it as it continues to

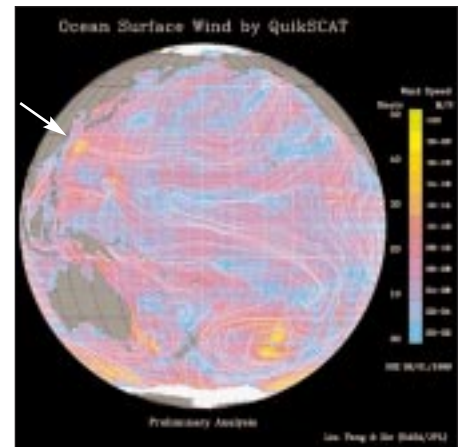
break up into smaller pieces."

JPL built the SeaWinds radar instrument and is providing ground science processing systems. With its broad, 1,800-kilometer-wide (1,116-mile-wide) swath and nearly all-weather capabilities, the SeaWinds scatterometer is providing unprecedented, frequent surface wind speed and direction measurements over the global oceans. Coupled with other satellite measurements of cloud patterns, water vapor and rain, the data are contributing to scientists' ability to predict the intensity, location and movements of hurricanes and other severe marine weather patterns.

"SeaWinds is allowing scientists to determine the location, structure and strength of these tropical depressions, typhoons and severe marine storms very quickly as they develop," said Dr. Timothy Liu,

QuikScat project scientist at JPL.

Since the beginning of its science mission, SeaWinds has performed beyond expectations, providing a near-global portrait of wind speeds around the world every day. "The spacecraft and its SeaWinds instrument are performing fabulously," said Jim Graf, QuikScat mission manager at JPL. □



Data on wind speeds and direction in the Pacific Ocean on Aug. 1 gathered by the SeaWinds radar instrument show the intense surface winds of Typhoon Olga, which can be seen moving near South Korea (arrow).

Remote Agent wins software award

By JOHN G. WATSON

Remote Agent, an artificial intelligence software package designed to command a spacecraft, has been named co-winner of NASA's 1999 Software of the Year award. Honorable mention went to ASPEN, an artificial intelligence package also developed at JPL.

Award winners, judged on innovation, impact and usability, were selected from a field of 50 entries from more than 150 corporations, universities and government laboratories.

The Remote Agent artificial intelligence used on JPL's Deep Space 1 may be thought of as one step on the path to self-aware, self-controlled and self-operated robots, exploring rovers and intelligent machines.

Over three days last May, Remote Agent planned Deep Space 1 activities on board and then carried out the plan without ground intervention, a feat previously accomplished only in science fiction. The software package took command of Deep Space 1 during a flight experiment and detected, diagnosed and fixed problems, showing that it can make decisions to keep a mission on track.

"This technology will allow us to pursue solar system exploration missions that only a few years ago would have been considered too elaborate, too costly or too dependent on teams of Earth-bound controllers," said Dr. Doug Bernard,

Remote Agent manager at JPL.

Experts from JPL and NASA Ames Research Center, Moffett Field, Calif., pooled their expertise to conduct the Remote Agent experiment, designed to push the limits of spacecraft autonomy. Their efforts proved that this sophisticated artificial intelligence software is capable of commanding the spacecraft with "high-level" goals, such as "communicate with the Earth on the agreed-upon schedule" or "fire the main engine as needed to stay on the desired trajectory."

To demonstrate Remote Agent's versatility, scientists created four simulated failures designed to test the software's abilities. During one of the simulated failures, the spacecraft's camera appeared to be stuck in the "on" position, thus impacting total spacecraft power availability. In response, Remote Agent formulated and executed a new plan that accounted for the fact that the camera could not be turned off.

Honorable mention winner ASPEN makes planning decisions for spacecraft, rovers and telecommunications ground stations based on reasoning about their states and resources. Along with Remote Agent, the second software co-winner is Genoa, a progressive failure analysis software system developed at the NASA Glenn Research Center at Lewis Field in Cleveland. □

Women's award nominations sought

The Advisory Council for Women (ACW) is collecting JPL nominations for this year's Women at Work Medal of Excellence.

Women at Work is a non-profit center in Pasadena that provides employment services and educational programs for women. Each year the center solicits funding support from local businesses through activities such as its Medal of Excellence luncheon, to be held in October. Corporate sponsors nominate one or two female employees from their organization to receive the medal, awarded at the luncheon.

Through the ACW, JPL sup-

ports this activity each year both as part of a community outreach effort and as a means of providing some additional rewards and recognition for JPL employees.

Among the criteria considered for nominees are accomplishments/achievements, enhancements that impacted overall team work performance, JPL community outreach and camaraderie with co-workers.

Submit recommendations along with a short bio for each nominee to Brigitte Badae, mail stop 67-215B, or via e-mail to her. The deadline for nominee submissions is Friday, Sept. 10. □

Rogan

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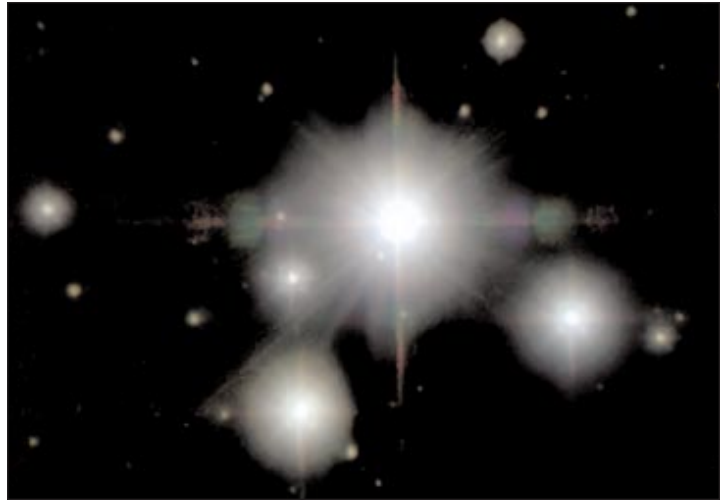
et. O'Neil explained that instruments on the 2003 rover will select the best places to search for samples, drill into rocks and cache samples for their return to Earth along with another set of samples collected by the 2005 mission.

Rogan concluded his JPL visit by viewing the field integrated design and operations (FIDO) rover, an advanced-technology prototype for the 2003/2005 Mars sample return missions. Dr. Paul

Schenker, manager of the Exploration Technology Rover task, described the rover for Rogan.

Stone said the restoration of the \$400 million in the budget process "is the first step in what we all hope will be the restoration of the entire NASA budget." With the current restoration, the agency faces a cut of about 10 percent in its FY 2000 budget, "which will affect many NASA programs, including a number at JPL," he noted.

The full House and the Senate are expected to vote on NASA's FY 2000 budget in September. □



These images of the binary star QS Aql demonstrate the improved imaging resolution and sensitivity of the Palomar Adaptive Optics System. The left image is typical of the blurred image usually

obtained from Earth's surface. The binary nature of the target is obscured by atmospheric turbulence. The right image was taken with the Adaptive Optics System system turned on.

New optics system helps clear the skies for stargazers

By ENRICO PIAZZA

Since Newton's time, astronomers dreamed of observing the sky without the distortion caused by Earth's atmosphere. Now, a team of scientists at JPL has managed to deliver what sky-watchers had been deprived of for centuries. And, starting next February, the system will be available to JPL and Caltech astronomers on an ongoing basis.

Using a sophisticated adaptive optics system at the 5-meter diameter Hale Telescope on Palomar Mountain, the Palomar Adaptive Optics Project last month successfully snapped images of stars from the ground at a resolution 10 times higher than those taken by the same telescope without the correction. These "corrected" images have a resolution in the infrared twice as fine as those captured by the *Nicmos* camera aboard the Hubble Space Telescope.

The core of the adaptive optics system is a bendable mirror attached to 241 computer-controlled actuators.

"We push and pull on that mirror to provide the equal and opposite amount of optical path correction needed to take out what the atmosphere is doing," said Dr. Richard Dekany, the team leader.

"By operating this mirror very fast—we update it 500 times each second—we correct whatever mischief the atmosphere has done. It has to go that fast because the

atmosphere is constantly changing."

Dr. Mike Shao, Space Interferometry Mission chief scientist, advocated the idea to build an adaptive optics instrument at Palomar once the technology advanced to the point where an adaptive optics system for such a large telescope became cost-effective. In January 1995, Shao recruited a team that began working on the project.

Early astronomical results from the project are promising. The adaptive optics team has succeeded in eliminating more than 96 percent of the wavefront error of starlight passing through the Earth's atmosphere.

Future applications of the instrument are even more exciting than the current results.

"We are happy to report our first success of correcting the Earth's atmosphere on such a large telescope," Dekany said. "But the most exciting news is that the same technology we used to correct the 5-meter telescope here on the ground may be applicable for the correction of large optics in space for future programs."

Once the adaptive optics system technology can be applied to telescopes in space, the cost of those missions will be dramatically reduced because a moderately well-corrected mirror could replace the extremely expensive ones currently used.

"There is a real cost saving

because we no longer have to polish an incredibly smooth and heavy piece of glass to an excruciatingly high figure quality like we have done in the past," Dekany said. "In space, the benefit of precision wavefront control is that it allows you to use a less expensive primary mirror, along with relaxed thermal and structural requirements."

While this technology has been developed for ground applications—where precise wavefront control is necessary to correct for the aberrations due to the atmosphere—the synergy with space applications is high.

"Eventually we could use a very lightweight material, maybe even a flimsy material," Dekany said. "This technology is perfectly suited for future very large telescopes and interferometers in space—20, 30, 40, 50 meters in diameter and more. This is very exciting news for JPL's future." However, Dekany said that there are caveats that go along with this technique from the ground. The adaptive optics system requires a bright natural guide star to work and its corrected field of view is about 1 arcminute, considerably narrower than that of the Hubble telescope.

"The correction is only truly accurate in the direction pointing towards the guide star," Dekany said. "The next star over will sample a different bit of atmosphere, and not get exactly the correction it needs. So in many ways spaceborne optics continue to have advantages over ground-based adaptive optics. But for certain observations—for example, imaging the environment close in to nearby stars—we can now exceed the resolution of the Hubble Space Telescope from the ground."

On Earth, the system currently works with infrared observations, but

Dekany said in the next five to 10 years the technology could advance to the point where ground-based visible adaptive optics observations will be possible.

"The quality of correction you need is much higher in the visible as it gets harder and harder to correct to the same fraction of a wavelength as the wavelength gets shorter," Dekany said. "As we upgrade the system, we'll be investigating different technologies that can provide a higher order of correction. One possible technology, based upon special liquid crystal light modulators, could open the field up from having a couple hundred actuators like now to having perhaps millions of actuators."

In space, where atmospheric aberration is not a factor, the technology works equally well in both the visible and infrared. Collaborating with the Palomar Adaptive Optics team is Dr. John Trauger of the Earth and Space Sciences Division, who is leading a team to space-qualify a deformable mirror just like the one that drives the adaptive optics system to extend the technology to space applications.

"Once qualified, I believe this and similar technologies will be widely utilized in future large optics in space," Dekany said.

Among current NASA projects that could incorporate this technology is the Next Generation Space Telescope.

For more information on the system designed and built by the Section 383 team, go online to <http://ao.jpl.nasa.gov>.

The adaptive optics team will continue to work on refining the instrument into next year, preparing it for general use, Dekany said. □

“ People don't work at JPL . . . just for money. They also work for the intangible things, the whole package that includes the kind of work they do, the environment in which they work, and the relationships with peers and colleagues.

Feedback is an important part of responding to what the employees need and want in a work environment . . . Just as our environment is changing, we want to continue to meet the needs of employees in their busy lives.

Employees are Lab's best resource

By MARK WHALEN

With the great number of missions JPL now oversees, employees are busier and more challenged than at any other time in the Laboratory's history. In one of an ongoing series of *Universe* articles about change at JPL, Human Resources Director Susan Henry discusses the effects of the new environment on JPL staff as well as new and ongoing programs offered to recognize employees' hard work and success.

What do you see as a major transition point for employees?

The whole culture is changing. In the past, many people spent their whole career at JPL. It was assumed that this was a very stable place, you could stay here forever if you wanted to, there would always be interesting work, and things wouldn't change a lot.

The biggest change is that people will no longer work on a single project for 10 years, as many of our staff have traditionally done. But they may work on 10 interesting projects in 10 years, which is even more exciting.

In the new environment we have today, how can employees expand their career opportunities?

We have outstanding training programs in managerial, general and technical areas, as well as career counseling and mentoring programs for our staff. In addition, the Lab offers tuition reimbursement for graduate schools for up to \$10,000 a year and undergraduate programs up to \$3,000 per year. These are just a few of the things available to all eligible employees. And as I mentioned, there are opportunities to work on multiple projects.

Do you believe employees have begun to feel better about their work environment?

Yes. Someone told me at the free lunch celebration in June that "this feels like the old JPL," when people felt like they knew each other, there was camaraderie, and they had time to have fun together. It was great to see that about 4,000 staff members enjoyed that day. We decided to hold the first of these events following the launch of QuikScat. We wanted not only to recognize that mission, but also JPL's having launched six missions over a nine-month period. That lunch was also in celebration of getting ISO certification and a lot of other efforts.

I want to continue to recapture those good feelings people had before.

Haven't some people felt a sense of loss that



PHOTO BY SCOTT CHAVEZ

Susan Henry

it's not "the old JPL" anymore?

Yes, I hear that comment from employees. I think it used to be a laid-back, fun kind of environment around here. It's still fun, but it's hectic, and the pace is incredible. In fact, we have more work booked for the next five years than we ever have had over that amount of time.

Last year, when employees were asked for their visions of what JPL could be in the future, you said it was your goal that JPL would one day be an "employer of choice." What does that mean?

What it boils down to is what makes you feel good about coming to JPL each day. The reality today is that people don't work at JPL—or anywhere else—just for money. They also work for the intangible things, the whole package that includes the kind of work they do, the environment in which they work, and the relationships with peers and colleagues. It's not only direct and indirect compensation and the other benefits we have; employees need a balance of all those things to be happy in their lives.

How are JPL employees offered that balance? What's new in your efforts to give employees some of those intangible things?

First of all, Caltech has awarded JPL a \$1 million bonus for the Laboratory's outstanding

performance over the past year. Caltech's fee for operating JPL for NASA is based on the agency's report card on JPL. As an incentive, Caltech has in recent years returned some of that award fee to JPL based on its outstanding performance. It's really wonderful money because it's unrestricted. This year, Dr. Stone decided that the \$1 million should be used for employees. About \$400,000 is already being spent or will be spent for FY '99, with another \$600,000 to be allocated for FY 2000.

Who decided how the award fee would be spent on behalf of the employees? Was this a management decision?

Ideas for spending the award fee money came from a great number of employees, most of whom were not management. During the rollout of JPL's Strategic Plan last year, I spoke at about a dozen meetings about the concept of being an "employer of choice" and got a lot of immediate feedback from people across the Lab. We also received valuable input from the Advisory Council for Women and Advisory Council for Minority Affairs, and did random surveys on the mall and outside the cafeterias. We also benchmarked companies that were identified by Fortune magazine as the 100 best to work for in the United States.

We reviewed the things that those companies did to be recognized by Fortune and, if they seemed doable at JPL, we put them on our initial list. Some ideas made the final cut, some were not possible here (such as stock options), and some we may try to do in the future. In any case, the Fortune competition will be an ongoing source of best practice information in the future.

What programs and events are already under way to recognize employees' efforts?

First of all, you may have noticed that over the last 12 to 18 months we have had more celebrations on Lab. That is an active effort to recognize the hard work and contributions of the Lab's employees and to achieve some of our employee change goals, which are part of JPL's implementation strategy introduced last year and are available online at <http://techinfo.jpl.nasa.gov/implementationplan>. These goals have been identified as the areas where cultural transformation is needed. One of the employee goals is to celebrate our successes to foster teamwork and collaboration.

The free lunch celebration on June 22 was

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Employees

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the first such celebration. And there's more to come.

In addition, we've started to recognize employees' birthdays by providing a greeting card and a lunch coupon worth \$7 at a JPL cafeteria. In early FY '00 there will be a plan to provide employees the use of an off-site sick-child care facility by contracting services with a licensed provider at a reduced rate.

We know that each of the award fee ideas will not appeal to every JPL employee, so we've tried to put together a combination of activities and services that will appeal to everyone in some way.

To supplement team celebrations, JPL offers pizza lunch gift certificates. See the Reward and Recognition home page at <http://eis/sec614/reward> for more information. And recently, with great success, Starbucks coffee was added to the Building 167 cafeteria menu.

Last year's Family Day, when employees had the opportunity to show their families their workplaces up-close, was a big success. Is this part of the award fee program?

Yes, Family Day now falls under the award fee funding; last year it was paid for under the director's discretionary fund. When we made up the list of award-fee options, Family Day was one of the first things we wanted to continue. I'm sure it will be bigger this time because it was such a popular event last year, when more than 3,500 people attended. We received a lot of positive feedback and thanks from employees and their families, many of whom indicated they would like to see this as an annual event.

When will Family Day be held this year?

This year we've decided to hold Family Day in early October. Last year, the event was held a couple of weeks before our public Open House, which made it particularly tough on the volunteers. Just as last year, employees and their families will be offered a complimentary lunch and JPL souvenir as a gift. In addition to employees' family members being able to see the workplaces up close, which they normally cannot do when they visit, a number of facilities will be open for tours.

As a result of the input you've received, what other options are

being considered to spend this money for the staff? Are contractors eligible for these benefits?

Currently, there are 19 options under consideration, ranging from celebrations to services to improved facilities. Eight out of 19 of options are available to Category A (on-site) contractors. Some of the programs can't be offered to contractors, because of certain guidelines within the Internal Revenue Service. But whenever we can, we do include contractors.

Aside from the programs funded by the Caltech award fee money, what other kinds of ongoing programs and benefits are currently available to JPL employees? Is everyone aware of what is available?

The award fee funds to be spent for employees' benefit will augment a whole series of services that are available for everyone here to take advantage of right now. For a list of current programs, benefits and services see <http://eis/hr/empserv.html>. The new <http://hr> Web site has a lot of information on the many programs available. These are things that are in addition to salary and other benefits such as medical insurance and retirement plans. There are literally dozens of direct and indirect benefits employees can take advantage of.

Indirect compensation includes, for example, cash and other awards through our Reward and Recognition Program; childcare assistance; and numerous benefits for employees' families. Our employee assistance program includes a full-time counselor to help staff deal with a variety of issues. Other non-compensation benefits include everything from our support groups and wellness programs to the credit union and rideshare services. And there are the career development opportunities programs I mentioned earlier.

Is anything being done in the area of direct compensation for employees?

Yes. The new Bonus Awards Program, which is in addition to the new base pay program, is under way. At our Open House this year, a supervisor mentioned to me that he had just handed out a Bonus Award to one of his employees, who was absolutely thrilled. It was a total surprise, and he was unaware that this kind of bonus was available at JPL.

This is a really nice feature of the pay program, and we're following what's done in outside industry. More information is available on the Compensation home page at <http://>

<http://>hr/compensation.

How do the award fee benefits and ongoing programs fit together?

If we're going to keep up with our competition for the best employees, these are all things we need to do to be an employer of choice in the future. It's not enough for employees to just get their paycheck. Additional compensation, benefits and services are all a part of making JPL a more rewarding place to work.

How can employees best pro-

vide you with feedback on the effectiveness of these programs and ideas for other programs?

Feedback is an important part of responding to what the employees need and want in a work environment. I encourage any employee to e-mail or call Monica Garcia or Nancy Kapell in the Reward and Recognition and Employee Services Group with their ideas or comments.

Just as our environment is changing, we want to continue to meet the needs of employees in their busy lives. □

NOVA

Continued from page 2

William Krueger, Otrid Liepack, Bruce McLaughlin, Miles Miller, Marie Slonski, Richard Springer, Laura Su, Rhonda White.

Element 3214: Michael Orosco.

Element 3231: Hien Nguyen, Michael Sieffert, Larry Varnell, Richard Wetzel.

Element 3238: Ellis Miner.

Element 3239: Marshall Fong, Richard Grumm, Vena Pontiac, Lee Wigglesworth.

Element 3273: Pranab Banerjee.

Section 330: Carol Lorre.

Section 331: Daniel Gutrich,

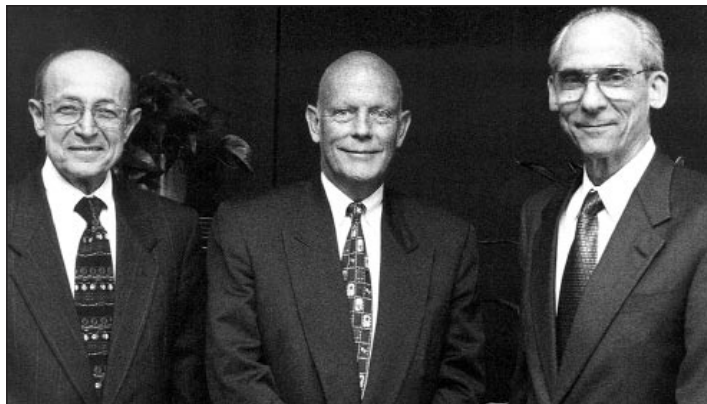
Randy Herrera, Andrew Makovsky, Michael Sheha, Ramona Tung.

Section 333: Abner Bernardo, Larry Fowler, Gregory McDowell, Benjamin Saldua, Stephanie Cowans, Peter Gorham, Oliver Lay, Kurt Liewer, Katrina Melendez, Annie Murray.

Section 336: Inam Haque, Amy Holst, Tomas Komarek, Derrick Nybakken, Eric Schwartzbaum.

Section 341: Randy Bartos, Gary Blackwood, G. Mark Brown, Steve Collins, Brian Cox, Gary Esparza, Don Gibbs, Steven Gunter, Greg Harrison, Sara Katrdzhan, Ching Leang, Audrey Mark, Dennis McCreary, Victor Mora, Paula Pingree, Valerie Ward.

Section 344: Kenneth Brown,
See NOVA, page 7



JPL PHOTO LAB

JPL Chief Scientist Dr. Moustafa Chahine, left, and Lab Director Dr. Edward Stone, right, visit with Nobel laureate Dr. Richard Smalley.

Nobel laureate's talk addresses nanotechnology

Dr. Richard Smalley, the 1996 recipient of the Nobel Prize in chemistry, addressed JPL staff earlier this month as part of the Director's Topical Seminar Series. Smalley discussed buckytubes, new material and devices derived from carbon that are expected to form the strongest fiber ever made, with a tensile strength approximately 100 times stronger than

steel at only one-sixth the weight.

In his introduction to Smalley's talk, JPL Director Dr. Stone noted that "the field of nanotechnology is an area of growing interest nationwide and here on Lab and on Campus."

A videotape of the talk is available for loan from Audiovisual Services at von Kármán Auditorium; call ext. 4-6666. □

NOVA

Continued from page 6

Christine Buchanan, Peter Jones, Yee Lee, Christian Liebe, Huy Luong, Heidi Luu, Tom McCarthy, Charles Minning, Michael Newell, Richard Williamson.

Section 345: Wafa Aldiwan, N. Talbot Brady, William Breckenridge, Paul Brugarolas, Diana Burrows, Susan Crowe, Hari Das, Ali Ghavimi, Fred Hadaegh, Reba Hart, David Hecox, John Hench, Cindy Huynh, Roger Klemm, Jeffery Levison, Mark Maimone, Guy Man, Elihu McMahon, Edward Mettler, Duane Morgan, Issa Nesnas, Kouji Nishimoto, Christine Preheim, Evelyn Reed, Frederick Serricchio, Robert Sherwood, Gurkirpal Singh, Robert Steele, Charles Vanelli, Ashton Vaughs, Kenneth Vines, James Wang, Garth Watney, Muh-Wang Yang, Kathi Younker.

Section 346: Sumith Bandara, Martin Buehler, Ratnakumar Bugga, Debra Cuda, Evan Davies, Serge Dubovitsky, Jason Feldman, Michael Fitzsimmons, Chen-Kuo Huang, John Liu, Chuck Manning, Mark McKelvey, Jason Mumolo, Amy Ryan, Marshall Smart, Nhan Tran, Steve Vargo, Hugo Velasquez, Larry Whitcanack, Jarka Wilcox.

Section 350: Anne Swatfigure, William Tibbitts.

Section 351: Gordon Blackhall.

Section 352: Traci Bergin, Robin Bruno, John Demmitt, Patrick Dillon, Robert Hall, Mark Johnson, Paul MacNeal, Lloyd Nessler, Douglas Packard, John Roth, Robert Troy.

Section 353: Arturo Avila, Todd Barber, Richard Cowley, Tosh Fujita, Hartwell Long, Taylor Luan, Jerry Millard, Eric Payan, Georg Siebes, Daniel Thunnissen, Patrick Wu, Andre

Yavrouian.

Section 354: Eric Baumgartner, Ben Dolgin, Steven Elliott, Tony Ganino, Terry Huntsberger, Brett Kennedy, Anthony Lai, Alfred Nash, Jose Rodriguez, Paul Schenker, P.K. Sharma, Donald Strayer, Jo Tillis.

Section 357: Dean Allen, David Brown, Mark Duran, Donald George, Jerry Gutierrez, W. Darrol Houser Jr., Raymond Kariger, Gary Keel, Dennis Maciej, Thomas McKeown, Patrick Olagues, James William Pearson Jr., David Rice, Larry Ruple, Norm Schwartz, Jerry Weisbaum, Lyle Zink.

Section 361: Roger Bartoo, Neil Troy.

Section 364: Donald Calkins, Jose Flores, Ronald Holland, Michael Rafferty.

Section 383: Mark Colavita, Robert Downer, Renaud Goullioud, Peter Lawson, Robert Spina, Mitchell Troy, Stephen Unwin, Jeffery Yu.

Section 385: Edward Blazejewski, Charles Budney, Todd Jones, Julie Keelin, John Lou, Colin Mahoney, Alan Mazer, Charles Norton, Harold Sobel, Sugi Sorensen.

Section 387: Steve Labrecque, Jose Tamayo.

Section 388: Eugene Chu.

Section 389: Tyler Brown, Donald Collins, Carol Dinolfo, Joseph Donhauser, Robin Dumas, Rosemary Guerrero, Rosemary Hagerott, Christopher Hawley, Gloria Nguyen, Yolanda Oliver, Kelly Perry, Rosanna Sumagaysay, Susan Volk.

Section 391: Diane Fisher.

Section 393: Michael Tankenson.

Section 395: Paul Backes, Michael Burl, Becky Castano, Eugene Chalfant, Steve Chien, Ashley Davies, Tara Estlin, Grace Fisher-Adams, Alex Gray, Kathryn Little, Tobias Mann, Eric Mjolsness, Darren Mutz, Gregg Rabideau, Andre

Stechert, K. Tso.

Section 470: Cathy Davis.

Section 507: David Peters.

Section 509: Jeffery Behar, Julie Jackson.

Section 621: Leslie Berridge, Dion Duarte, Margaret Easter, Gerald O'Connell, Geoffrey Pomeroy.

Section 622: Debbie Lee.

Section 623: Virginia Kemp.

Section 625: Richard Hillquist.

Section 700: Kathleen Miller, Nicholas Thomas.

Section 701: Janet Holden, Robert Metzger.

Section 726: Jodi Berlin.

Section 730: Rod Zieger.

Section 740: Barbara Bowman.

Section 742: Faye Gottschalk, John

Kelin.

Section 745: Aimee Whalen.

Section 746: Michelle Leonard.

Section 750: Noemi Portugues.

Section 770: Thomas Nolan.

Section 775: Gail Linehan.

Section 780: Fred Vescelus.

Section 783: Gracie Hallowell.

Section 790: Dora Mata.

Section 880: Alfred Paiz.

Section 920: Michael Ebersole, Phil Varghese.

Note: The names of NOVA honorees will no longer be published in *Universe*. For future reference, go to the Reward and Recognition Program home page at <http://eis/sec614/reward/nova.htm>. □

New look coming for *Universe*; feedback sought on ads

Beginning in late summer or early fall, *Universe* will debut a redesign that will include a new look for classified ads.

The new *Universe* design, created by the Graphics Services Group in Section 644, will include the use of new type fonts and graphic elements. And in an effort to include more news of interest to employees, several options are under consideration to repackage classified ads.

Universe readers are invited to provide us with some feedback on a redesign for ads.

Options under consideration include the current four-page *Universe* format plus a one-page insert for ads, as well as relocating ads to a Web site, for which ad deadlines would not be a factor.

Feedback should be sent by e-mail only to feedback@universe.jpl.nasa.gov. Send in your comments by Tuesday, Aug. 31. Please do not send ads or other material to this address; continue to e-mail ads and other information to universe@jpl.nasa.gov.

Thank you. □

LETTERS

I would like to thank my many friends here at JPL for their kindness and support throughout the difficult long years of my mother's illness, her transformations through Alzheimer's. Friends become one's extended family, a comforting embrace that helps one to endure. I thank you also for the expressions of sympathy, after my mother's passing, and also for the lovely plant sent by the ERC.

Lucia Marino

□□□

Thank you to my friends and co-workers for the expressions of sympathy following the loss of my wife, Gerry. Also, thanks to the ERC for the beautiful plant.

Bill Charlan

□□□

My husband and I would like to express our thanks to all of our friends and co-workers for the kind words, cards and the beautiful plants that were sent after the passing of our very much loved daughter. She will always be missed, but in our heart forever. Thanks to all.

Teresa Broms

□□□

My family and I would like to thank my co-workers in the Division 36 office for their kind words and support during my father-in-law's illness and death. We greatly appreciate the memorial plant from ERC. Thank you all.

Bob Klotz

FOR SALE

APPLIANCES, Frigidaire, heavy duty, extra lg., stackable washer & dryer, 1.5 yrs old, \$700; Frigidaire dishwasher, \$200; GE refrig., 25 cu. ft., side by side w/water & ice dispenser, \$600. 626/792-9185.

BABY ITEMS, breast pump, Nurture III, dbl.

style w/all attachments, \$20; high chair, high-end, full-featured model, swivel wheels, x-large tray, seat lifts out to attach on table-top or converts to child's chair, \$40; swing, battery operated, lift-out seat is also a baby carrier, \$30; infant car seat, lift-out baby carrier model, up to 20 lb., \$15; spring bouncing seat, hangs in doorway w/o screws, \$5. 249-3677, eves.

BABY ITEMS, Gerber swing, 2 spd., \$35; infant car seat, star/moon pattern, \$40; Baby Bjorn front pack, \$45; baby gym, \$15; bouncer seat, \$10; assorted baby toys & maternity clothes. 546-1402. BEDROOM FURN., chest, \$25; dresser, \$25; nt. stand, \$15; or all 3 pc. for \$55. 323/660-2364. BICYCLES, specialized 1991 Allez, 23" (58.4 cm) carbon fiber frame, Suntour 12-sp. shifters, very light & stiff, choice of triathlon or std. drop bars, look pedals, \$350/firm; Fuji 12 spd., med. sz, gd cond., alum. wheels, Suntour shifters, \$90/firm. 626/794-0886, Ted.

BICYCLE SEAT, Rhode Gear, for young child, exc. cond., \$50. 626/643-9769.

BOOKS, Murmurs of Earth, The Voyager Interstellar Mission, C. Sagan, et. al., 1978, 1st ed., fine cond. except prev. owner stamped name/logo on title pgs.; dust jacket nr. fine except one 1/4" tear, \$25; Men From Earth, Buzz Aldrin, '89, inscribed & signed on title pg., "To Trey Best Wishes Buzz Aldrin" fine cond./j fine except slight wrinkle on spine bottom, \$100. 805/527-1259, email: jjaaz2zy@aol.com.

CHINA SET, 60 pc., \$70/obo. 909/592-0780, Ana. COLLECTIBLES, McDonald's intl bears, set of 4, \$25; McDonald's '99 beanie babies, 12 in set, \$35; baseball/football cards, 200 ass'td. major, stars, inserts, rookies, specify team or player to be included, \$20; autographed 8x10 Randy Moss rookie of year w/cert. of authenticity, \$60. 626/914-6083. COMPUTER, Mac G3 266MHz DT, 160MB RAM, 4GB HD, 24X CD, Zip, ext. 56K V.90 modem, \$1,350. 240-5059.

COMPUTER, Mac II FX, Conner 140 MB HD, 780 kb 3.5" FD, 1.4 MB 3.5" FD, 20 MB RAM, System 7.5.3, 32-bit addressing, 14" color monitor (16 colors), Global Village Teleport 33.6 fax/modem, Netscape Communicator, \$100. 541-0062.

DESK, L-shaped computer desk with accessory shelf on one side, \$25. 248-7331.

DINING RM SET, med. oak, 44" round table, converts to 68" oblong tbl., 2 leaves within table, w/6 chairs, 2-pc. hutch, mirror back w/light, \$775. 909/394-4557.

ESTATE SALE, 8/21 & 8/22, 8 a.m. - 4 p.m., 4935 Oakwood Ave., La Canada. 790-7337.

FILE CABINET, 4 drawer, putty, top quality, exc. cond., \$45. 323/660-2364.

FURNITURE, sofa + 2 matching armchairs, contemp. style, looks brand new (only 1 yr old), must sell, relocating, pd \$1,200, \$300/obo; baby crib, European make, w/gold trimmings, incl. matr. & drawers, cloth bumpers avail. free, must sell quickly, pd \$500, \$80/obo. 548-3442 eves./weekends.

FUTON, qn size w/solid oak frame, (black/floral reversible pad is free), \$150. 790-3899.

GAS RANGE, GE XL44, hardly used, removed for new construction, \$200. 957-2173.

GUITARS, 1955 Fender P-bass, blond, Bakelite pickguard, contour body, \$3,800; 1961 Gibson Les Paul/SG, cherry red, sideways vibrola arm disabled for tuning purposes, vibrola arm missing, rest orig. w/hard shell case, \$3,300; 1964 Gretsch Chet Atkins 6120, orange, double cutaway, bigsby, w/hard shell case, \$1,850; 1967 Gibson ES-35, cherry red, trapeze bridge, all orig. w/orig. hard shell case, \$1,950. 626/798-7339.

HOT WHEELS, ltd. edition Sojourner Mars Rover in box, 24k gold-plated permanently mounted on silver-plated base, \$40. 626/332-2682.

MATTRESS, Select Comfort ultra qn-sz. matr. & foundation, top of the line pillow-top w/dual-cont. wireless remote, all pieces in exc. like new cond., org. cost \$1,700, \$850/obo. 626/355-7086.

MODEM, Apple Geoport adapter fax/modem, Model M1694 express for power Mac, \$25. 541-0062.

MODEMS, external USR 28.8, \$50; Cardinal 33.6, \$25; USR Courier w/everything, \$150. 626/791-1779.

MOVING BOXES, many sizes including wardrobes, great cond., best offer. 547-0845.

MOVING SALE, small appliances, clothing, books, chairs, misc. household items, lots of goodies, 331 Sturtevant Dr., Sierra Madre, Aug 28-29, 9-4. 626/355-1353.

MOVING SALE, antique dishes, clothes, jewelry, furniture, pictures, art objects, books, many new items. 323/660-2364.

MUSICAL INSTRUMENTS, cheap trombone and black grand piano for beginner. 909/598-0065.

PATIO FURNITURE, white metal, off-white custom cushions, gd.-looking angular design, lg sofa + lg 2-seater w/built-in table, coffee tbl. & armchair; tbls. w/frosted glass, \$150. 626/285-8760.

PHONOGRAPH, antique, hand crank console, just restored, mahogany case circa 1920s, \$550/or trade for 2 248-5282.

PHOTOGRAPHS, 40" x 30", color, framed; 2 tall-ship pics by a prof. photog., vg cond., 1 of Span. ship in SF bay, one of a German ship nr Puerto Rico, \$70/ea, \$120/both obo. 626/568-8298.

PICTURE FRAMES, 3 made of brass, 22" x 28", \$6/ea, \$15 for all three/obo. 626/568-8296.

PRINTER, Xerox Diablo 630 daisy-wheel w/print wheels/ribbons, exc. cond., w/works great, \$10/obo. 626/568-8298.

REFRIGERATOR, apt. sized, separate ref./freezer, refrigerator cool but not cold, freezer works great, \$40. 626/794-8737.

ROCKING CHAIR, glider, wood frame with maroon cushions, good condition, \$40. 710-7694 or bbanerdt@concentric.net.

Continued on page 8

SEWING MACHINE CABINETS, 3 modules incl. hydraulic lift, 4-drawer stack, 2nd mach. storage/use, work spc. extension shelves, white w/oak trim, on castors, vg cond., orig retail \$1,700, sell \$800. 360-3481.

SIGN, Coors "Artic Ice" Beer metal advertising signs, approx. 18-1/2"x15", irregular shape, \$2/ea. 626/332-2682, Steve.

SOFTWARE, Avery Kids Printertainment kit and supplies, includes CD-ROM for Windows or Windows95, designs/prints greeting and laminated ID cards, door signs, stickers, etc., works with HP, Canon & other popular inkjet or laser printers, \$10. 626/332-2682, Steve.

SPRINKLER VALVE ADAPTERS (2), automatic, model 756LG3/4, new, \$10/ea. 790-3899.

STEREO RECEIVER, Kenwood V87R, 80w RMS/chan, remote control, passive subwoofer and 2 satellite speakers, \$75. 240-5059, Larry.

STEREO SPEAKERS, Definitive Technology, BP-20, bipolar, \$600/pair/obo. 626/291-2990.

STROLLER, Graco full-size stroller, navy blue, like-new cond., used 2 mo., \$80. 626/791-6107.

TABLES, glass, four 2-shelf tables w/brass feet, three make up a coffee table (one round 2.5-ft. dia., two "half-moon"), 4th is a round end table (2.5-ft. diam.), \$125/obo. 909/592-0780, Ana.

TABLE SAW, Rockwell, 10", blade adjusts up/down & angles, ripping/side tables left & right, 3/4 hp motor, 7-8 yrs old, low hrs, \$295/obo. 626/303-5595.

TODDLER BEDS, 2 Graco, white metal/plastic frames w/matresses, used 8 mo., \$150 for both/obo. 626/303-5595.

TOYS, McDonald's, Inspector Gadget's water gun arm and screwdriver leg. 909/598-0065.

TREADMILL, Trimline electronic, speed, time, distance display, like new, 3 yrs old, \$550. 909/394-4557.

VACUUM, Hoover Steam Deluxe with tools, excellent condition, \$125. 249-6883.

WATERBED FRAME, king sz, walnut, vg cond., \$75/obo; 2 end tbls. w/glass tops, \$20. 626/568-1382.

WEB-TV, Sony, with cordless keyboard & remote, works like new, \$100/obo. 731-6238.

WEDDING DRESS, exc. cond., used once, in garment bag, white, straight, long sleeves, bow in back, \$40/obo. 626/568-8298.

WET SUIT, women's sz 8, 1.5 yrs old, gd cond., \$25. 248-7331.

VEHICLES / ACCESSORIES

'91 ACURA Integra GS, white, 4-dr., auto, air, all/options, great sound syst., CD ch., security & keyless entry, tinted, sliding moonroof & much more, 93K mi., all records, dependable and economical for commuting to wk., reduced to \$6,950. 626/440-1069.

'91 CADILLAC Seville, 4 dr., blk. ext., gray leather int., 4.9L V8, 4 spd. auto, loaded, 100K mi., exc. cond., orig. owner, \$10,545. 790-1419.

'88 CHAMPION RV, 19 foot, self-contained, less than 30,000 miles, need paint, \$14,000. 626/444-6691, Forrest Janes.

NOTICE TO ADVERTISERS

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Universe

Editor

Mark Whalen

Photos

JPL Photo Lab

Universe is published every other Friday by the Public Affairs Office of the Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109.

Advertising is a free service offered only to JPL, Caltech and contractor employees, retirees and immediate families.

Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov. E-mail ads are limited to six lines.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

To change an address, contact your section's administrative assistant, who can make the change through the HRS database. For JPL retirees and others, call Xerox Business Services at (626) 844-4102.

'95 DODGE Intrepid ES, 3.5V6, emerald/gray, tan leather int., 53K miles, pwr. seats, pwr. windows, climate ctrl, trip computer w/compass & temp, trac ctrl, alloy wheels, 7 spkr. Infinity stereo cassette, sports susp., remote entry, exc. cond., very clean, \$8,000/obo. 626/432-1990, Kevin.

ENGINE, for Cadillac (will work in years 91-95) new, factory crated never used; 4.9 L, V-8, \$1,300/obo. 515-5761.

'97 FORD Mustang GT, 4.6L SOHC V8, 5 spd., 17" alloy wheels, ABS, a/c, cruise, AM/FM cass. stereo, pwr. windows/locks, alarm, fog lamps, 12K miles, \$17,595/obo. 626/796-5216.

'96 FORD Contour GL, champagne color, 4 dr. sedan, 4 cyl. 2.0 engine, auto. trans., a/c, dual airbags, pwr brakes/steering/doorlocks, heated pwr mirrors, cruise, AM/FM/stereo tape, rear window defroster, velour/cloth seats, lighted entry, \$9,450. 949/855-0771.

'93 FORD Aerostar XLT, tan, 75k mi., a/c, pwr. steering/brakes/windows, AM/FM/cass., great cond., \$8,500/obo. 626/294-0209.

'85 GRUMMAN 14' alum boat w/trailer & 25 Hp Merc. outbd motor, \$1,500/obo. 909/599-2598.

'96 HONDA Accord LX, blk ext./gray int., 56k miles, 4DR, tinted rear windows, loaded, exc. cond., \$14,000/obo. 562/869-8045.

'90 HONDA Civic LX, 4-dr., loaded including alarm and sound system, \$2,700.01. 645-9101.

'88 HONDA Civic DX, hatchback, 5 spd., AM/FM stereo/cass., only 49K mi., exc. cond., orig. owner, new brakes, tires, timing belt, must sell by 9/5, \$3,500/obo. 626/355-1353, David or Anne.

'85 HONDA Shadow 700cc, V-Twin, shaft drive, auto. valve adjustmt, 6-spd (w/overdrive), water cooled, exc. tires, lo maint., reliable, gd cond., red & black, incl. street fairing & Tourmaster saddlebags, \$1,500. 626/794-0886, Ted.

'83 HONDA 200X, ATC, 3 wheel off-road motorcycle, vg cond., runs great, \$850/obo. 626/303-5595.

'80 HONDA Civic CVCC, hatchback, 1.3L, 5-spd manual, great gas mileage, runs well but needs TLC, \$500. 248-8103.

'96 JEEP Cherokee Sport, 4 dr., 4x4, 4.0L, 6 cyl, green/tan, CD, rack, tow pkg., 2-yr extnd warranty (until 7/01), registration just pd., exc. cond., 50K miles. 626/836-9254.

'94 MAZDA 626 LX, 4-dr., 5-spd., pdb., ps., A/C, pw/pdl, AM/FM stereo cass., sunrf., exc. cond., fully maintained, teal green, \$6,200/obo. 626/355-7086.

'97 MERCEDES BENZ E420, 11.3 k mi., white, auto, V8, fully loaded, Lo Jack, pwr sun screen, CD, like new, \$44k/obo. 714/281-8718.

'82 MERCEDES 240 D, burgundy, low mileage, 45 mpg, loaded, manual; body, tires, trans. in gd cond., engine needs work, \$1,200/obo. 909/620-1364.

'71 MERCEDES 250 coupe, white dual carburetor, six cylinders, 2 dr., everything automatic, a/c, low mileage, runs great, needs minor adjustments, \$1,500/obo. 909/620-1364.

'52 MGTD Fiberfab kit complete with '65 Bug, 1/3 built, \$3,500. 786-0695.

'96 NISSAN Maxima, exc. cond., loaded, all pwr, moonroof, tint, new batt. recent a/c overhaul, always garaged or covered, 155k mi., \$4,400/obo. 626/335-0775.

'88 OLDSMOBILE Delta 88 Brougham, loaded, vg cond., gd family car, 90K miles, \$3,300/obo. 626/793-8783.

'75 OLDS Cutlass Salon, 2-dr., hardtop, silver, red interior exc., w/reclining fabric bucket seats, body vg w/no rust, new vinyl roof, 350 engine, exc. handling, HD suspension, overhauled systems include a/c, new BFG T/A tires, rare model, best offer over \$3,500. 626/446-4771, Bruce.

'73 OLDS Delta 88 Royale, 4-dr., hardtop coupe, 455 eng., dual exhaust, exc. cond., interior like new, 80K miles, orig. paint, overhauled a/c, recent tires and vinyl roof, smooth, quiet, powerful & lg., unusual in this cond., best offer over \$3,000. 626/446-4771.

'89 PLYMOUTH Grand Voyager SE, 90k mi., 1 owner, exc. maint., garage parked day & nt., a fine car, \$3,500. 626/794-1398.

'88 PLYMOUTH Voyager LE, loaded, pwr windows, pwr seat, 7-pass., rebuilt trans., roof rack, gd cond., \$1,500/obo. 626/303-3719.

'89 SAAB 9005, black, 3 dr., runs great, 5 spd., sunroof, \$2,000. 626/793-5345.

'86 TOYOTA Corolla, 4 dr, 110K mi., \$600. 790-9772.

'91 YAMAHA Virago 1100, black with gray accent, lots of chrome, Jardine pipes and foot controls, \$3,550/obo. 626/355-6350, Paul.

FREE

GERMAN SHEPHERD, 1-2 years, beautiful, playful, loving, gentle w/people & other animals; rescued from traffic 8/7; we will neuter him if you adopt; needs a y; waiting in humane soc. 626/285-8760. IGUANA, green, to good home. 952-1303.

WANTED

CED, Selectavision videodiscs and equipment. 952-1303, Aaron.

CHINESE GAME, GO, any cond. 546-1402, Dave.

GOOD HOME, I am fostering two 6-mo.-old kittens, tan & black Siamese & B&W tuxedo tabby, recently taken fr. neglected home, very friendly and affectionate. 626/798-3150.

GRADUATES, Belmont High Sch. (LA), '57-62. 956-1744, Barbara.

INVENTOR seeks EE to build circuit board for hand-held device w/liquid crystal or LED display, timer & audio indicator. 323/935-8146.

REFRIGERATOR & TV, for poor & starving students. 626/487-5928.

ROOMMATE, share a 2-bd. apt in Pas., close to JPL. 626/644-3453.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

VOLLEYBALL PLAYERS, all levels, every Tues. nt 8-10 at Eagle Rock High School, \$4/nt. 956-1744, Barbara.

FOR RENT

ALTADENA, affordable 1 bd. guest house, fenced yard, Florencia

area above JPL, new carpet and paint, clean, quiet, \$425 + utils., (approx. \$70), \$450 security deposit. 626/794-6076.

CLOSE TO JPL, furn. or unfurn. rm./ba., nice view, pretty house, pleasant and quiet neighborhood, shared use of kitchen/washer/dryer/garage/pool, seven miles from JPL, maid service once a month, non-smoker, 1 tenant only, \$425, util. pd. 323/256-0535.

EAGLE ROCK, furn. rm in sgl-fam. house, nice area, 10 min./JPL, priv. entr. and ba., share kitch. & laundry priv., \$350 incl. util. 213/256-1785.

EAST PASADENA, nr Caltech, 2 bd., 2 ba.s. sitting rm, kitch. w/dining area, stove & refrig, laundry hookups, living rm./dining rm area, large gar. enclosed bkyd., pd. water/gardener, no pets, avail. Sept. 15, \$1,100, \$1,500 dep. 626/794-0455, evs./weekends.

LA CANADA, guest house w/own addr./mail service, 1 bd., off-st. prking, water, gardeners, shared access to tennis crt, avail. Sept. 1, \$840. 952-1304.

LA CRESCENTA home, 2 bd., 1 ba., 2-car detached garage, FP, patio, fenced backyd, quiet st., gd neighb' h'd, \$1,350. 249-9522.

MONTEROSE, 1 bd., apt w/ dinette, 10 min./JPL, \$595. 626/445-0884.

PASADENA, short-term condo lease (3-12 mo.), 1,000 sq. ft. fully furn. 1 bd., 1 block/Caltech, \$1,095 + \$110 util, gar., Indry. 626/285-0730.

PASADENA, nr PCC, 2-bd., 1 1/2-ba., townhouse styl., central a/c, built-in range & oven, refrig., cpts, drapes, dspsl., indry., cvrd. parking, \$725. 790-7062.

PASADENA, 1 bd. + bonus rm., LR, DR, nr Lake Ave. shopping, 1920s era, 1,000 sq. ft., lots of storage, carport space for 1 car, washer/dryer on premises, \$900/mo. 249-3602 or 626/398-8865.

SYLMAR townhome, 2 bd., den, 1 1/2 ba., walk-in closet w/dressing area, pantry, cathedral ceilings, shaded patio, 2-car gar., plenty storage, gated comm. w/pool and spa, \$950. 576-9864, Paul.

TEN MIN./JPL, 1 bd. apt., has dinette, \$595. 249-2235.

REAL ESTATE

BIG BEAR, new cabin 2 blocks fr. lake, 2 bd., 2 ba., mud/laundry rm., \$129,000. 909/585-9026.

EAST ALTADENA, 3 bd., 2.25 ba. in 3/4 acre, ocean view, <http://www.hunnicutt.net/rice/grafsof@thegrid.net>, 858/759-8953.

LA CANADA, 3 bd., 2 ba., furn. rm, cent. heat/air, hwdwood, flrs, FP, newly decorated inside, new landscaping; \$399,000. 244-8253.

SIERRA MADRE CYN, beau. home surrounded by oaks, spectact. vw; 3 bd., 2 ba., lg. kit., form. din. rm., \$440,000. 626/355-7177.

SUNLAND condo, 2br., 2 ba., cent. HVAC, fireplace, lg patio, cathedral ceiling, laundry rm., 2-car access gar., tennis, swimming, Jacz., nr shopping, 10 min. JPL, \$124,750. 949-5725, Anne.

PALM SPRINGS, exquis. 2 bd., 2 ba. villa for vac or long term, newly remodeled, w/skylight, patio & 2-car gar.; across Living Desert, great priv., secure resort, tennis cts., multiple pools & spas, clubhouse, great locality, close to Palm Desert Marriott, downtown, tourist attractions, major golf courses. 909/620-1364.

PASADENA, townhome b't. '98 nr Rose Bowl, 3.5 mi/JPL, gated community, -1,400 sq. ft., 3 bd./2.5 ba., 2-car attached gar., prof. organized closets, firepl., alarm, ceiling fans w/lights in all bd., covered balcony off master, wood flrs. everywhere, all Corian counters, lg enclosed backyd fully landscaped w/auto sprinklers, palm/fruit trees, pool, Jacz., basketball court, \$260,000/obo. 626/568-8298.

VACATION RENTALS

BIG BEAR LAKE cabin, nr lake, shops, village, forest trails, 2 bd., sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ and more, JPL disc. price, from \$65 per night. 909/599-5225.

BIG BEAR, 7 mi./slopes, full kitch., 2 bd., 1 ba., slps 6, reas. rates, 2-nt min., no smokers, no pets, exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.

BIG BEAR cabin, walk to village, quiet area, 2 bd., slps. 8, compl. furn., F/P, TV/VCR, \$75/nt. 249-8515.

BIG BEAR LAKEFRONT lux. townhome, 2 decks, tennis, pool/spa, beaut. master bd. suite, slps. 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, exc. vw. 248-8853.

HAWAII, Kona, on 166' of ocean front on Keauhou Bay, priv. house & guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing, beautiful; swimming, snorkeling, fishing, spectact. views, near restaur., golf, other attractions, available after Sept. 626/584-9632.

HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microw., dishwasher, pool, priv. lanai, slps. 4, 4/15-12/14 rate: \$95/nite/2, 12/15-4/14 rate \$110/nite/2, \$10/nite/add'l person. 949/348-8047.

MAMMOTH, Chamonix condo, 2 bd., 2 ba., sleeps 6, fully equipped elec. kitchen, microwave & extras, fireplace, cable TV, VCR, FM stereo, pool & sun area, o/v Jacuzzi, sauna, game, rec. and laundry rms, BBQ area, cond. to shops, hiking, summer events, daily/weekly rates, summer rates thru Nov. 1, 249-8524.

MAMMOTH, Snowcreek, 2 bd., 2 ba., w/loft, sleeps 6-8, fully equipped kitchen incl., microwave, D/W, cable, VCR, phone, balcony w/view to mtns., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE, on the sand, charming 1-bd. condo, panoramic view, walk to pier/harbor, pool, spa, game rm., slps. 4. 949/786-6548.

PACIFIC GROVE house, 3 bd., 2 ba., fp, cable tv/vcr, stereo/CD, well-eqpd kit w/microw, beaut. furn, close to golf, bches, 17 Mile Dr, Aquarium, Cannery Row, JPL discnt. 626/441-3265.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.

S. LAKE TAHOE KEYS, waterfront, 4 bd., 3 ba., [1 bd. & liv. rm upstairs - hcp access fair] slps .12+; frlpc. on 2 levels, decks overlook priv. dock & ski lifts, gourmet kitch., bikes, sail/paddle boats, 3 color TVs, VCR, stereo w/tape/disk, indoor/outdoor pools, hot tub & beach; lighted tennis, 10 min./skiing, casinos, golf, 1 hr/wine country, 3-day min., \$1,095/wk for high season [15 June to 15 Sept; 22 Nov. to 1 March]; \$495/wk lo seas., + \$90 cleaning fee. 626/578-1503.