



Dr. William Pickering 1910–2004

“Dr. Pickering was one of the titans of our nation’s space program.”

— Dr. Charles Elachi

Dr. William Pickering, a central figure in the U.S. space race and director of JPL from 1954 to 1976, has died.

Pickering passed away March 15 of pneumonia at his home in La Cañada Flintridge. He was 93. Known affectionately as “Mr. JPL” and an original “Rocket Man,” Pickering was remembered by friends and longtime colleagues during a memorial service on March 20 at Caltech’s Beckman Auditorium.

“Dr. Pickering was one of the titans of our nation’s space program,” said JPL Director Dr. Charles Elachi. “It was his leadership that took America into space and opened up the moon and planets to the world.”

“As one of the leaders at the beginning of the Space Age, Bill Pickering knew that deep space was the true frontier of this new realm of human activity, so when asked, he chose exploring the planets as JPL’s role in the newly formed NASA,” noted former Lab Director Dr. Ed Stone. “This was one of the key decisions that shaped the future of the Laboratory.”

“Another thing that particularly affected my career was his decision to restructure the cancelled Grand Tour mission into the Voyager mission to Jupiter and Saturn,” Stone added. “Continuing on to Uranus and Neptune, Voyager became an unequalled journey of exploration and discovery. That decision also resulted in the remarkable opportunity I have had to join in that journey as the Voyager Project Scientist, a role that greatly influenced my career and continues to do so as the two spacecraft search for the edge of interstellar space.”

In 1958, as director of JPL, Pickering led the successful effort to place the first U.S. satellite, Explorer 1, into Earth orbit. Following on the success of Explorer 1, Pickering was instrumental in leading a new era of robotic space exploration, including the first missions to the moon and the planets.

“Dr. Pickering deserved the very great reputation he had then, and which still persists to this day,” noted Dr. Bruce Murray, who served as JPL director following Pickering’s retirement. “He was the spiritual leader of the Lab, and his presence gave JPL a sense of security.”

Added Dr. Lew Allen, who served as JPL director from 1982-1990, “I was very much the beneficiary of Dr. Pickering’s actions in the early days. He determined where JPL’s place would be in the future. His leadership and decisions provided JPL with a mission focused on robotic space exploration. For me, that was very exciting to be a part of.”

Pickering began at JPL in 1944, at a time when the Laboratory was developing missile systems for the U.S. Army. He organized the electronics efforts at JPL to support guided missile research and development, becoming project manager for Corporal, the first operational missile JPL developed. It was not a simple project. In an interview in 1994, Pickering joked about the trials and tribulations of testing the early guidance systems.

“For the 100th Corporal that we tested, I pushed the [launch] button—and the darn thing went east instead of north. I never pushed the button again,” he recalled. Eventually, under Pickering’s direction, the Sergeant solid-propellant missile was designed and developed at JPL.

In 1954, Pickering was named director of JPL, and he soon had his hands full with the space race. Following the first Soviet Sputnik launch, JPL and the Army Ballistic Missile Agency were given the assignment in November 1957 to place the first U.S. satellite in orbit. Pickering directed the JPL effort, which, in just 83 days, provided the satellite, telecommunications, and the upper rocket stages that lofted Explorer 1 into orbit on Jan. 31, 1958. It was considered one of Pickering’s greatest achievements and laid the groundwork for future robotic exploration of the moon and planets.

In 1975, Dr. Pickering recalled the achievement of Explorer 1 and its impact on a new era of space exploration. “The event was symbolic of the mixing process between engineering and science, between the world and the research laboratory ... it had mixed rocket technology with the universe, and reduced astronautics to practice at last.”

On Dec. 14, 1962, the Mariner 2 spacecraft successfully completed a flyby of the planet Venus, culminating a 109-day journey of more than 180 million miles: humankind’s first penetration to the vicinity of another planet. On July 14, 1965, following a 228-day journey of more than 325 million miles by Mariner 4, Pickering’s team obtained the first close-up pictures of Mars. Four more Mariner missions reached Venus and Mars before Pickering retired from JPL in 1976.

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Rover finds rocks likely formed in salt water

By Guy Webster

JPL’s Opportunity rover has demonstrated some rocks on Mars probably formed as deposits at the bottom of a body of gently flowing saltwater.

“We think Opportunity is parked on what was once the shoreline of a salty sea on Mars,” said Dr. Steve Squyres of Cornell University, principal investigator for the science payload on Opportunity and its twin Mars Exploration Rover, Spirit.

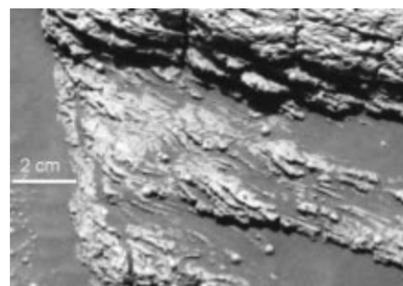
Clues gathered so far do not tell how long or how long ago liquid water covered the area. To gather more evidence, the rover’s controllers plan to send Opportunity out across a plain toward a thicker exposure of rocks in the wall of a crater.

Dr. Ed Weiler, NASA’s Associate Administrator for Space Science, said, “This dramatic confirmation of standing water in Mars’ history builds on a progression of discoveries about that most Earthlike of alien planets. This is a profound discovery for astrobiology. This result gives us impetus to expand our ambitious program of exploring Mars to learn whether microbes have ever lived there and, ultimately, whether we can.”

“Bedding patterns in some finely layered rocks indicate the sand-sized grains of sediment that eventually bonded together were shaped into ripples by water at least 2 inches deep, possibly much deeper, and flowing at a speed of 4 to 20 inches per second,” said Dr. John Grotzinger, rover science-team member from the Massachusetts Institute of Technology.

In telltale patterns, called crossbedding and festooning, some layers within a rock lie at angles to the main layers. Festooned layers have smile-shaped curves produced by shifting of the loose sediments’ rippled shapes under a current of water.

“I was astonished,” said Dr. Dave Rubin, a U.S. Geological Survey sedimentologist at the Pacific Science Center in Santa Cruz, who served in the peer-review process. He said the sedimentary structures detected by Opportunity look very much like some areas on Earth. He compared the ripples in the rock to those found in the Colorado River.



The dip of fine layers at angles to each other suggests that the water that created the cross-lamination on “Last Chance” was flowing from left to right.

“Ripples that formed in wind look different than ripples formed in water,” Grotzinger said. “Some patterns seen in the outcrop that Opportunity has been examining might have resulted from wind, but others are reliable evidence of water flow.”

According to Grotzinger, the environment at the time

the rocks were forming could have been a salt flat, or playa, sometimes covered by shallow water and sometimes dry. Such environments on Earth, either at the edge of oceans or in desert basins, can have currents of water that produce the type of ripples seen in the Mars rocks.

A second line of evidence, findings of chlorine and bromine in the rocks, also suggests this type of environment. Rover scientists presented some of that news three weeks ago as evidence the rocks had at least soaked in mineral-rich water, possibly underground water, after they formed. Increased assurance of the bromine findings strengthens the case that rock-forming particles precipitated from surface water as salt concentrations climbed past saturation while water was evaporating.

“Many features on the surface of Mars that orbiting spacecraft have revealed to us in the past three decades look like signs of liquid water, but we have never before had this definitive class of evidence from the Martian rocks themselves,” said Dr. James Garvin, NASA’s lead scientist for Mars and lunar exploration. “We planned the Mars Exploration Rovers Project to look for evidence like this, and it is succeeding better than we had any right to hope. Someday we must collect these rocks and bring them back to terrestrial laboratories to read their records for clues to the biological potential of Mars.”

“The particular type of rock Opportunity is finding,” Squyres said, “with evaporite sediments from standing water, offers excellent capability for preserving evidence of any biochemical or biological material that may have been in the water.”

Weiler said Meridiani Planum, which Opportunity is exploring, has now become “the prime landing site” for the 2009 Mars Science Laboratory, which he called NASA’s first astrobiology mission.

MER “has already met our wildest expectations,” he said. “We owe a debt of gratitude to the JPL engineers and scientists on this mission.” Squyres echoed that sentiment, calling the findings “a fantastic piece of work by the engineers at JPL.”

The project expects Opportunity and Spirit to operate several months longer than their initial three-month prime missions on Mars.

News Briefs

Boy Scouts troop thanks Stardust

Stardust Project Manager TOM DUXBURY accepted a plaque of thanks from the Boy Scouts' San Gabriel Valley Chapter earlier this month (below). The chapter selected JPL and the Stardust mission as the best representation of the area in which they live, and selected Stardust last year for their official patch.

San Gabriel Valley's Troop 735 designed a "gateway" that served as the entrance gate each troop prepares for the National Scout Jamboree. Stardust supplied images that were used in the gateway display.



Hong's optical work honored

DR. JOHN HONG, Chief Technologist of the Astronomy and Physics Directorate, has been elected Fellow of the Optical Society of America. His work in holography and its applications in information storage and processing was cited as a significant contribution to the optical sciences.

Hong joined JPL in 2002.

Santa Anas' positive benefits shown

Southern California's Santa Ana winds wreak havoc every year, creating hot, dry conditions and fire hazards. Despite their often-destructive nature, a study of the "Devil Winds," conducted using data from JPL's Quick Scatterometer (Quikscat) spacecraft and its Sea-Winds instrument, shows the winds have some positive benefits.

"These strong winds, which blow from the land out into the ocean, cause cold water to rise from the bottom of the ocean to the top, bringing with it many nutrients that ultimately benefit local fisheries," said DR. TIMOTHY LIU, the Quikscat project scientist.

Liu and DR. HUA HU of Caltech, in a paper published last year in *Geophysical Research Letters*, revealed satellite observations of the Santa Ana effects on the ocean during three windy days in February 2003. Quikscat identified the fine features of the coastal Santa Ana wind jets—showing location, strength and extent, which other weather prediction products lack the resolution to consistently show, and moored ocean buoys lack sufficient coverage to fully represent.

Quikscat's high-resolution images of air-sea interaction were used to measure wind forces on the ocean. Other satellites and instruments, like the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) and the Advanced Very High Resolution Radiometer, were used to measure the temperature and biological production of the ocean surface, which respond to the wind.

"There really is no other system that can monitor Santa Ana winds over the entire oceanic region," Liu said. "Scatterometers such as Quikscat have a large enough field of view and high enough resolution to easily identify the details of coastal winds, which can affect the transportation, ecology and economy of Southern California."

For images and more information, visit <http://www.jpl.nasa.gov/releases/2004/82.cfm>.

Slow down, stop and wait

JPL Transportation has recently reported a rash of traffic "near misses" on Lab, with a large number involving passengers disembarking from buses. Drivers on Lab are increasingly attempting to drive around (following traffic) or past (opposing traffic) stopped buses, and in the process are increasingly coming close to hitting disembarked pedestrians. For everyone's safety, Transportation reminds JPLers to slow down, stop and wait before proceeding.



"As you may have already noticed, all buses operating on Lab now have 'swing out' STOP signs and flashing lights that instruct drivers in both directions to stop while those alerts are activated," said Willis Chapman, manager of the Logistics and Technical Information Division 270. "This

instruction is a direction, not a request: drivers must stop and allow pedestrians to pass or cross.

"Remember, all of us at JPL—pedestrians, drivers and riders—are trying to get somewhere on time. We should all expect to arrive safely. When the bus stops—and at all other times—slow down, stop and wait."

And the winner is ...



Dr. Eddie Yunstel, senior robotics engineer on the Mars Exploration Rovers mission (left), joined astronaut Leland Melvin in presenting four awards during the NAACP Image Awards, held March 6 at Universal Studios. At the show, the NAACP honored Michael Anderson, a crew member on the Space Shuttle Columbia, which was lost Feb. 1, 2003.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

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

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

Saturday, March 27

Folk Music—Steve Gillette and Cindy Mangsen will perform at 8 p.m. in Caltech's Beckman Institute Auditorium. Tickets are \$15 for adults, \$5 for children under 12. For more information, call (626) 395-4652.

Sunday, March 28

"Upright: The Evolutionary Key to Becoming Human"—Dr. Craig Stanford, co-director of the Jane Goodall Primate Research Center and professor of biological anthropology at USC, will give this Skeptics Society-sponsored lecture at 2 p.m. in Caltech's Baxter Lecture Hall. Donation: \$8 for nonmembers, \$5 for members, free for JPL/Caltech community. For more information, call (626) 794-3119.

Monday, March 29

JPL Store Reopening—The store's newly remodeled site will be open for business. Watch for a grand opening event in early April.

Wednesday, March 31

AVIRIS Earth Science and Applications Research Workshop—To be held at Pasadena's Sheraton Hotel, 303 E. Cordova St., from 8 a.m. to 5 p.m., continuing through April 2. JPLers considering attending are asked to register at <http://aviris.jpl.nasa.gov>. For more information, call Sharis Dilanchian at ext. 4-2605.

Dr. Ed Stone Lecture Series—Dr. Kevin Baines, principal scientist in the Planetary and Life Detection Section, will present "The Clouds of Jupiter: New Views of Jovian Meteorology, Dynamics and Global Circulation from Galileo, Cassini and the Hubble Space Telescope" at 11:30 a.m. in Building 180-101.

Robotic Vehicles—Dr. Richard Murray, chair of Caltech's division of engineering and applied science, will lecture at 8 p.m. in Beckman Auditorium. Free admission. For more information, call (626) 395-4652.

Volunteer Professionals for Medical Advancement—Meeting at 10:30 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Thursday, April 1

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

JPL Stories—Dr. Claudia Alexander, manager of the U.S. portion of the Rosetta Project and also a children's book author, will present "Grace Under Fire: Working International Cooperation



with the European Space Agency" at 4 p.m. in the Library, Building 111-104. If you have questions about the story series or wish to participate, call Teresa Bailey at ext. 4-9233.

Friday, April 2

Caltech Women's Club—Newcomers and members are invited to a Welcoming Coffee from 9 to 10:30 a.m. in Winnett Lounge. For more information, contact Carol Andersen at (818) 790-8175 or carol@vis.caltech.edu.

Murder By Poe: The Acting Company—Four Edgar Allan Poe tales of revenge, obsession and murder will be presented at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21 and \$17; high school age and under, \$10. For more information, call (626) 395-4652.

Sat.-Sun., April 3-4

Cherry Blossom Festival—The Asian American Council seeks volunteers to participate in the annual Pasadena event, held from 10 a.m. to 6 p.m. in Victory Park. The JPL booth will feature a Mars Exploration Rover model and handouts on current projects. For more information, log on to www.pasadenacherryblossom.org. If you would like to participate, call Matthew Lum, ext. 4-4750 or Reggie Sakurai, 4-4883.

Sunday, April 4

Chamber Music—The Eroica Piano Trio will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$27, \$23, \$19 and \$15. For more information, call (626) 395-4652.

Tuesday, April 6

Duh-Oh!—David Silverman, former supervising animation director for *The Simpsons*, will speak at 8 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652.

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-271.

Wednesday, April 7

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

"The Transition from *Australopithecus* to *Homo*"—Paleoanthropologist Berhane Asfaw will lecture at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$12. For more information, call (626) 395-4652.

Thursday, April 8

Clogging Class—Meeting at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

Ian McEwan—One of the most accomplished contemporary British writers, McEwan will lecture at 8 p.m. in Beckman Auditorium as part of Caltech's Words Matter Program. Admission is free, and a book signing will follow. For more information, call (626) 395-4652.

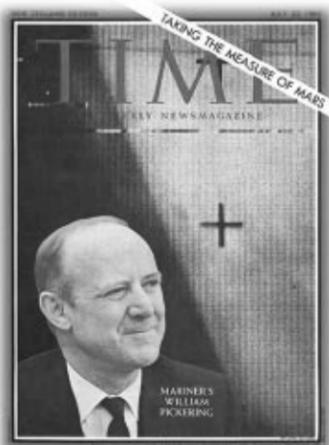
Friday, April 9

"Take Our Daughters and Sons to Work Day" Deadline—Those who will bring their child of between 9 and 17 years of age to JPL should register by today at http://hr/towork_day. For more information, call Nancy Kapell, ext. 4-9432, or Laurie Lincoln, 4-1612.

Preparing Requisitions Class—Shirlee Kurtz of the Acquisition Business Systems Office offers a training course from 8:30 a.m. to 3:30 p.m. in the 291-214 computer training room. It is designed for individuals who create requisitions in Oracle. To enroll, register at <http://jplregistrar.jpl.nasa.gov/stc/persreg>. For more information, contact Kurtz at ext. 4-9737.

Dr. William Pickering 1910–2004

Pickering was one of few people honored twice on the cover of *Time* magazine, in 1963 (left) and 1965.



Pickering joined other JPL officials in a 1963 visit with President John F. Kennedy in the White House. At right, he met with President Lyndon Johnson in 1965.

From left: Pickering, Dr. James Van Allen and Dr. Werner von Braun celebrate the success of Explorer 1.



Pickering with former Lab Directors Theodore von Kármán (center) and Frank Malina, 1960.

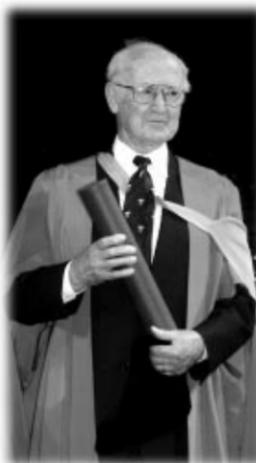


Pickering makes his way north on Sierra Madre Boulevard as the Rose Parade's Grand Marshal in 1963.



"Bill Pickering knew that deep space was the true frontier of this new realm of human activity, so when asked, he chose exploring the planets as JPL's role in the newly formed NASA. This was one of the key decisions that shaped the future of the Laboratory."

— Dr. Ed Stone



In March 2003 Pickering returned to New Zealand to unveil a memorial honoring him and Ernest Rutherford, who earned the Nobel Prize in chemistry in 1908. Pickering also received an honorary doctorate from the University of Canterbury in Christchurch.



In May 2002, Pickering (left) joined Drs. Ed Stone, Lew Allen, Bruce Murray and Charles Elachi in celebrating the 40th anniversary of the first U.S. planetary mission, Mariner 2.

Pickering and Explorer 1, 1998.



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On Jan. 1, 1963, following the successful flyby of Venus by the Mariner 2 spacecraft, Pickering rode as Grand Marshal of the Tournament of Roses Parade. His two appearances on the cover of *Time* magazine were in 1963 and again in 1965 following Mariner 4's encounter with Mars.

Pickering was honored by numerous awards throughout his career, including NASA's Distinguished Service Medal. In 1975, he was awarded the National Medal of Science by President Gerald Ford, and in 1976 he was given honorary knighthood from the Queen of England. He was also named to the Order of New Zealand, that country's highest honor.

JPL astronomer Eleanor Helin dedicated "Asteroid 5738 Billpickering" in his honor. The asteroid was discovered in 1989. Pickering also received awards from numerous science and engineering societies.

Pickering was born in Wellington, New Zealand in 1910 and immigrated to the United States in 1929 to study at Caltech. He obtained his bachelor's and master's degrees in electrical engineering, then a doctorate in physics from Caltech before becoming a professor of electrical engineering there in 1946. Pickering became a U.S. citizen in 1941.

He is survived by his wife, Inez Chapman Pickering, and a daughter, Elizabeth Pickering Mezitt. His son, William Balfour, passed away one day before Dr. Pickering's death. Donations may be made to the William H. Pickering Scholarship for New Zealand Graduate Students at Caltech.

Passings

WILLIAM CUNNINGHAM, a retired JPL engineer who worked on Voyager, Mariner and Galileo among other missions, died Oct. 20.

Cunningham worked at the Lab for 26 years. He is survived by his wife, Carolyn, sons Michael, Timothy, Chris and John, and two granddaughters.

Services were held at St. Dorothy's Catholic Church in Glendora.

Letters

Thank you to all my dear friends and co-workers for their thoughtfulness and kindness after the passing of my father-in-law. The gestures were comforting to me and my entire family. Also, many thanks for the cards and plant as well.

Lori Ludwig

My wife Barbara and I would like to thank the JPL community for all the cards, messages, plants and kind thoughts after the death of Barb's mom and my mother-in-law. We appreciate all the support and understanding we received during her illness. Special thanks to the NSTA office.

Erich Corduan

I would like to thank and express my appreciation for the lovely plant and card JPL sent following my mother's passing. She went very peacefully while I was at her bedside at the ripe old age of 92 (18 days short of her 93rd birthday).

John F. Pensinger

My sincere thanks to JPL's ERC, Facilities' management, friends and colleagues. The kindness and thoughtfulness that you showed at the time of my wife Maile's long illness and death will always be remembered. Thank you.

Thang Le and family

Classifieds

For Sale

AIR CLEANER, Hepa, large room size, \$60; FOOT STOOL, 1-step, sturdy, \$5; CARVING KNIFE, electric, \$5. 626/355-6923.

BABY ITEMS: crib, wood, made in Italy, incl. mattress, height adjustable, exc. cond., photo avail., \$150/obo; car seat, Century, front-facing, up to 40 lbs., gd. cond., \$25/obo. 626/791-6101.

BABY ITEMS, used 3-6 months: Graco 6-spd. swing, reclines, music, mobile, toy tray, new \$120, sell \$60; jump-up seat, Graco, \$15; bassinet, portable, insect screen, sunshade, \$15. 626/355-5166, Lloyd or Margot.

BOOK, first edition of Percival Lowell's "Mars and Its Canals" published by Macmillan in 1906, good shape, includes his observations of Mars, original cover, color Mars drawings, tissue paper covering each drawing, 626/798-8965, Randii Wessen.

BREAST PUMP, new Medela Pump-In-Style, sealed in original box from manufacturer, \$219. 909/576-5789.

BRICKS, used, sev. hundred, perfect for landscaping projects, \$0.75 ea. 626/403-7163.

CEMETRY PLOTS (4), Rosehills, Garden of Autumn: is developed, plots valued at \$2,500/ea., will sell for \$2,300/ea.; willing to sell plots separate if neces. 562/404-3464 x230, Janelle, betw. 7-4 or 909/986-4611, after 6 p.m.

CURTAIN RODS, cherry wood w/rings, brackets and ball finials, various lengths from 35"-102", \$15-\$25. 626/403-7163.

DESK for computer, O'Sullivan, model 61925, mobile, cherry veneer, exc. cond., like new, make offer. 626/449-0997.

DINING TABLE, glass, contemporary, beveled edge, 72" x 42", 5-panel glass pedestal, 4 black cloth chairs, pics. avail. 368-8649 or tcfs@aprelx.com.

DINNER JACKET, formal, burgundy color, men's size 40 long, like new, for cruises, weddings, \$25 or make offer; SLEEPING BAG, \$10. 626/793-1895, Albert.

DODGER TICKETS, selected games from season ticket package, loge level (orange), aisle 132, inside first base, 2 tickets per game face value, \$30 ea., see www.dlunac.net/tickets or 626/296-1253.

DODGER TICKETS from season ticket holder, loge, 4 seats behind 3rd base, 6 rows up, many games avail, sell at face value, \$23/seat. 790-5902.

DRYER, GE, gas, 5.7 cu. ft., extra lg. capacity, 2 yrs. old, exc. cond., \$200/obo. 720-7386.

DRYER, Whirlpool, 220V electric, Duet model, pale blue and white, nearly new, paid over \$800, sell \$350. 768-3465, Harold or Torrie.

EXERCISE MACHINE, pilates, exc. cond., \$80/obo. 248-7839.

FURNITURE: sectional, 2-piece, Bassett, one is sleeper, floral print; coffee table, 40"; end tables, (2) 26," mission style, all in gd. cond., parts can be sold separately, photos avail., \$500/obo. 626/791-6101.

FURNITURE: floor lamp, white; table lamps (2); electric blanket, queen; headboard, full to queen; dresser, 6-drawer w/tall mirror; nightstand, 2-drawer, walnut colored oak, exc. cond., \$200/obo; stereo console, am/fm,

phonograph, Magnavox, mid-'70s, honey color, make offer. 626/798-4821.

HOME BREW EQUIPMENT, two 5-gal. Cornelius kegs with ball locks, \$25 ea., misc. ball-lock hardware, clamps, hoses, \$20. 323/342-9363.

INCOME TAX GUIDE BOOK for '04, J.K. Lasser's, w/forms, brand new, \$10; DIET TAPES, Jenny Craig, set of 14, \$25; CONTROL CTR., computer pwr., 5 pwr. switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, \$20. 790-3899.

JEWELRY: earrings, bracelets, rings, includes vintage, turquoise and gemstones (lots of clip and pierced earrings); amethyst and diamond ring, set in 14K gold, sz. ~5-1/2; pearl ring, 8mm, set in 14K gold, sz. ~6. 626/398-4960.

LAWN MOWER, Murphy, 5 hp, 20", gas w/3-in-1 capability to mulch, bag w/side discharge, adjustable height, good working cond., \$95/obo. 909/576-5788.

MAH JONGG, brand new, one color white tiles, brought back from Hong Kong, \$75/obo. 714/280-7368.

MICROWAVE, Panasonic, white, \$40; SCANNER, UMAX 1220P for Windows, \$15; STEREO, Sony LBT-G2000, 3-disc CD changer, \$75; BED FRAME, queen, \$5. 323/342-9363.

MISC: blue or gray + oak high-back swivel desk chairs, \$69/ea.; ham radio home-brew transmitter & power supply, c. 1940, \$39; spare tire/wheel, donut, T10580D-13, used once, \$39; massager, electric, fits in chair, \$39; wireless intercom set, \$39; golf ball retriever, telescoping alum., 12", \$19; luggage set, Pierre Cardin 3-pc., \$19; bassinet attachment for Trend Traveler playpen, \$10. 626/798-4510.

MISC: camera, Canon Elph aps, \$50; cordless phone/ans. mach., Sony, digital, \$30; speakers, Acoustic Research, \$30/pr.; CD player, Sony Discman, am/fm, \$20; tuner/amp, Onkyo, 60 ch., \$80; zip drive, Iomega, +3 discs, \$20; tensor lamp, halogen, from Ikea, \$20; golf bag, Calloway, black, \$20; putter, ping i-blade, \$20; mattresses, Serta perfect sleeper, w/box spring & frame, twin pair, \$300/ea.; computer table, Relax the Back, mahogany, \$100; grandfather clock, Howard Miller, \$500. 213/810-8801.

MISC: foot massager, Brookstone electronic, multi-speed (orig. \$200+), \$50/obo; neck massager, Shiatsu (orig. \$45), \$15; muscle stimulator, Medtronic elec., (orig. \$600), \$75; book, Odd Thomas, Dean Koontz, 1st ed., \$10. 626/398-4960.

MISC: stove, O'Keefe & Merrit, \$475; table, kitchen, 4 chairs, \$350; matching set: desk, writing, dresser & nightstand, \$250; coffee table, teak, \$50; file cabinets, 2-drawer, \$10 ea. 626/394-9629.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. \$7500, sacrifice \$2,000; PORT REPLICATOR, for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, \$85; ULTRA ATA CONTROLLER CARD with cable, fits into 32-bit PCI 2.1 or 2.2 expansion slot on motherboard, brand new, \$20. 790-3899.

PLANTS for patio, potted, small ferns, succulents, ficus in 1/2 whisky barrel, 36 plants in all, some in exc. cond., some very scraggly, make offer on one, all or anything in between. 845-9125, Sam.

PLANTS for patio/house in ceramic pots, indirect sun/semi shade, various sizes, \$15-30; pots for plants, various sizes, \$2-\$15; BLINDS (2), roll-up bamboo-look, plastic, one 6 ft., one 10 ft. long, \$15 both; SIDE TABLE, Spanish design, wrought iron base, rectangular glass top, 18" x 40", \$50. 626/289-2795.

PRINTER, HP DW 600; UMAX scanner; cables, instruction booklet, extra cartridge. 626/351-6141.

PRINTER CARTRIDGES, for Epsom, black, unopened, S020187 for Stylus color 440/640/660/670 Stylus photo 750/1200, \$15/ea., 2/\$25. 661/297-8533.

PRINTER/COPIER/SCANNER, 3-in-1 WorkCentre XK35c, makes scanning or copying documents & books easy, 30-bit color, resolution 300 x 600 dpi, scan produces clear scans & sharp text, color & black ink cartridge, \$50/obo. 909/518-0998.

PRINTER/COPIER/SCANNER, Hewlett Packard OfficeJet R40, all-in-1, for Windows 95/98, CD ROM install disc, Adobe Business Edition, new ink cartridges, \$100/obo. 249-4053.

SAW, radial arm, Craftsman, \$50. 909/931-9433, Paul.

SMOKER, Char-Broil, red, like new, used 5 times, paid \$40, sell for \$25/obo. 248-9708.

SOFA, dual-recliner, \$250; love seat, \$100; COMPUTER DESK, \$30. 626/799-7593.

SUITS, women's (2), finely tailored, fully lined, new/exc. cond., fitted skirts, quality comparable to Talbot's, 1-red camel-hair, size 12 (10 +), \$50; 1-beautiful ivory, wool, size 10, \$100. 626/289-2795.

TELEVISION, Panasonic, 20" w/remote, \$75. 626/303-4750.

TRADING CARDS, Star Trek, by Impel, 25th anniversary, issued '91, sealed box w/36 packs, approx. 12 cards/pack, \$20. 626/332-2682, Steve.

Vehicles / Accessories

AUTO TEST SET, electronic, analog ignition oscilloscope displays both primary/secondary parade and raster wave-forms, full function analyzer w/timing light, all on a chrome roll-away cart, \$500. 249-6071.

'98 BMW 328i, 4-dr., flawless condition, 5-speed, aqua blue, 54K mi., power sunroof, on-board computer, alarm w/keyless entry, ABS, ASC, driver & passenger airbags, climate control, am/fm/cassette, sheepskin seat covers, \$15,500. 626/577-0068, Lou.

'95 BMW 325is, sports package, computer, metallic gray/gray, 6-CD changer, tint, exc. cond., 106K mi., \$9,500. 310/374-0855, Alfonso.

'92 CADILLAC Sedan Deville, 4WD, safe, solid, quiet, dependable, champagne, leather, power everything, 4.9L V8, a/c, am/fm/cass., moonroof, 20 mpg hiway, 17 city, new tires, recent hoses/wires/belts/radiator/front bearings, top end rebuild (heads, valves), catalytic converter, 126K mi., no accidents; pictures: www.futitlitarian.org, \$3,700/obo. 801/644-5807 or bfniamore@comcast.net.

CANOE, Old Towne, Katahdyn, 16', burgundy, used twice, retails \$849, sell \$600. 957-7742.

'01 CHEVROLET Cavalier, white, exc. cond., just smogged, \$3,950. 626/379-3503.

'00 CHEVY Silverado truck, 55K mi. on hwy.,

white w/camper shell + 7-ft bed, 2WD automatic, V6, 24 mi./gal., Kenwood CD/radio., no rust or corrosion, perfect shape, not an ext'd cab; we have a new baby and can't fit family in anymore; can send you pictures; starting price \$11,900. 323/913-0724, Alice.

'52 CHEVY pickup truck, 1/2-ton, 235 cid 6-cyl., 4-spd., gd. shape, primer gray, \$3,600. 626/794-1621, evenings before 8 p.m, Erik.

'96 CHRYSLER Concorde, 3.5L engine, 80K mi., green w/beige leather, one owner, power everything, CD, cassette, more, \$4,200. 768-3465, Harold or Torrie.

'97 DODGE Grand Caravan, sport pkg., 71K, V6, white w/tan interior, factory tint, overhead console, rear air, pwr. windows/locks/doors, security system, very sharp, avbattis@yahoo.com for pics., \$7,800/obo. 909/702-2326.

'99 FORD Explorer XLT 4x4, 82,000 mi. (90% hwy), 100K mi. warranty, loaded, Toredor Red, new tires/brakes, must sell, \$10,500/obo. Kevin 562/945-6167, Kirk 562/693-3158.

'98 FORD Ranger, 77K mi., auto, air, exc. cond., very clean, \$5,800/obo. 626/798-8071, Renee.

'99 GMC Yukon Denali, 74,000, loaded 4WD, leather, 6-CD changer, 2nd owner, great cond., \$18,000. 800/937-9200, Levi or Cathy.

'00 HYUNDAI Tiburon SL, VG cond, automatic, sunroof, \$7,999/obo. 626/487-6208.

'93 INFINITI G20, loaded, 117K, sunroof, new clutch just broken in, great mpg, very nice, e-mail for pics.: avbattis@yahoo.com, \$3,999/obo. 909/702-2326.

'94 ISUZU Trooper LS, 4-dr., 4WD, V6 3.2 L DOHC, auto, locking hubs, antilock brakes, cruise control, alarm, am/fm/stereo, 12-cd player, white, exc. shape, tinted windows, brush guard, new a/c, new transmission, pwr. steering/windows/locks, tilt wheel, rear window defroster/wiper, exterior spare tire, \$6,800/obo. 957-3296.

'98 JEEP Grand Cherokee Special Edition, 5.2L, V8, 4WD, 75K mi., power everything, cruise control, cassette, CD, prem. sound, dual airbags/power seats, moonroof, roof rack, tinted windows, tow pkg., tilt wheel, oversized tires w/new spare, prem. wheels, 4-whl. ABS, lots of after-market additions, must sell, great cond., pics. avail., \$10,700/obo. 352-6646, Ben or verdugo_verde@comcast.net.

'96 JEEP Grand Cherokee Limited, 4x4, 5.2L V8, premium sound w/6-CD, power everything, leather power seats w/memory, tinted glass, tow pkg., tilt wheel, air bags, cruise, roof-rack, very gd. cond., all records, 114K mi, \$7,200. 760/249-4262.

KAYAK, tandem, beautiful yellow/black, Nekky Tofino touring w/rudder assembly, \$1,800. 909/319-8338, Paul.

'73 MG Midget, 2-dr., convertible, new top/exhaust, good shape but needs some TLC, \$3,000/obo. 957-8068.

PUMP, grease/gear, manual, w/5-gal. container, incl. 6 ft. of 3/8 high-pressure hose w/ standard coupler, delivers grease at high vol./high pressure, exc. cond., \$40. 249-6071.

SAILBOAT, Lido 14 with sails and trailer, \$425. 626/447-5433, Robert.

'00 TOYOTA 4-Runner Limited, 4x4, 31K mi., loaded, leather, power seats, CD, sunroof, roof rack, \$20,750/obo. 909/599-3230.

'00 TOYOTA Tundra Limited, 56K mi., snug top shell w/carpet kit, tow pkg., all power, 6-CD in dash, new tires, \$17,900. 909/596-9007.

'99 TOYOTA Avalon XL, automatic V6, 4-dr., silver spruce w/ tan cloth int., power steering/seats/doors/windows, cruise control, am/fm/CD/cassette, a/c alarm, 51,800 mi., very clean, \$10,800/obo. 248-4003.

'98 TOYOTA Camry, 4-door, 96,200 mi, 4 cyl., black ext/gray int, 6-disk CD changer, new tires, tinted windows, alloy wheels, wood dash, more, \$7,900/obo. 425-9696.

'97 TOYOTA Rav4, 2-dr., 2 WD, automatic, a/c, dual airbags, 29 mpg, 160K mi., am/fm/CD, ultra-reliable, blue; photos at http://www.pobox.com/~Mark.Johnson/rav4.htm, \$5,500. 661/263-2760

'91 TOYOTA Dolphin motorhome, V6, 44K mi., cruise control, family floorplan, attentively maintained, awning, microwave, extra storage, 6 excellent tires, \$12,500. 626/798-4510.

WIND DEFLECTOR, Wind Wedge, set up for Ford pickup towing, 5th wheel trailer, deflects air around trailer frontal area, exc. cond., \$40/obo. 626/963-5727.

Free

SOFA AND LOVESEAT, solid gray w/gray & black pillows, the cats have been at 'em, but throw on some cheap slipcovers and they'll be fine for a few more years. 626/577-9859.

Wanted

CAT SITTER to watch 13-year-old Himalayan in my apartment, on most nights, in Old Pasadena for 2 weeks while I am out of the country in late April. 626/844-7854.

SHOP REPAIR MANUAL for 1994 Buick LeSabre 4-dr. sedan. 626/793-1895, Albert.

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

VOLLEYBALL PLAYERS, coed, no beginners please, Tues. nights 8 to 10 p.m. at Eagle Rock High School, \$4/nt. 956-1744, Barbara.

For Rent

ALTADENA house, 1 bd., 1 ba., 5 min. to JPL, 564 Ventura St., \$950. 626/798-5796.

ALTADENA room, quiet neighborh'd, nr. Woodbury & NY, 3.3 mi. to JPL, beautiful hardwd. floors, fireplace, washer/dryer, kitchen privileges, util. incl., high-spd. internet & cable avail. at add'l cost, \$500. 626/345-0625.

ARCADIA room, furnished, laundry and kitchen privileges, pool, no smokers, \$400. 626/448-8809, Shary.

BURBANK house, 3 bd., 2 ba., spacious master bd. w/deck new paint/carpet central a/c, parking, \$1,750. 248-9110, Ron.

HOLLYWOOD, large, single apt., 1 block from Metro/shopping, utilities paid, stove, refridge, secure bldg., newly decorated, street parking, \$695. 310/377-0316, Gerri.

LA CANADA, townhome-style apt., 2 bd., 1 3/4 ba., cent. h/ac, 10 min./JPL, \$1,500. 952-7490, Camille.

LA CRESCENTA, 2 apts., 10 minutes from JPL, 1 bd. \$875; 1 bd. with dinette \$950. 626/445-0884, John.

MONTEREY PARK home, 3 bd., 2 ba., 2 car garage, Brightwood school, near Atlantic & Harding; details: gapharm.com/house4rent; \$1,650. 626/576-5059.

MONTEREY studio, secure & priv., a/c, nice yard w/firepit, new carpet, no pets, \$675. 248-9110, Ron.

NORTH GLENDALE room in condo, private bathroom, share garage/patio/kitchen/living room, nice quiet area, non smoker, \$450 + 1/2 util. 323/449-2528, leave message.

PASADENA apts., furnished and unfurn., 2 bd., 1.5 ba., 2-story townhome-style, dishwasher, cent. a/c, refrig. & stove, laundry room, patio, parking, close to Caltech & JPL, \$1,095-\$1,125 + util. 626/577-3060, ext. 14, Dennis.

PASADENA apt. to share, furn.; 3 bd., 3 ba., townhome-style; patio, cent. a/c, laundry, close to Caltech/JPL, \$625 + 1/3 util., great for co-ops. 626/429-3677 or bettyrs@earthlink.net.

PASADENA condo, 1 bd., 1 ba., in small complex, close to Caltech/Old Town/Gold Line, refrig., new stove, central heat & a/c, carport w/storage, \$1,000 + dep. 626/797-2765.

PASADENA house for lease, 2 bd., 2 ba., hardwood floors in living/din. rooms, beautiful fire-plc. w/hardwood mantle, remodeled kitch., laundry rm., convenient location on tree-lined st. nr Rose Parade route, new paint/carpet, gardener, 76 N. San Marino Ave, \$1,800. 626/796-7222.

PASADENA house, 2 bd., 2 ba., hardwood floor, garage, fireplace, fa/ac, fenced backyard w/fruit trees, nice neighborhood, 10 mins. from Caltech, no smoker, pets OK, gardener, \$2,000. 248-1433.

PASADENA house, 3 bd., 2 ba., fr. formal dining room, hardwood floors, built-ins, large backyard, 2-car garage, new appliances, \$2,000. 626/644-5018, Amber.

PASADENA, spacious 1- & 2-bd. luxury apts., stall shower and tub, huge closets, fireplace, tiled entry, large kitchen, lg. windows, light & airy, 6-unit gated bldg., subterranean pkg.; 1 bd. \$1,200, 2 bd. \$1,600. 626/449-1155.

PASADENA, Mediterranean townhome in exc. N.E. area, 2 bd., 1 1/4 ba., formal dining rm., built-in kitchen., hardwood floors, encl. garage & yard, \$1,495. 952-5568.

SIERRA MADRE, lg. 1-bd./1-ba. unfurn. apt., new custom carpet/drapes, upgrades thru-out, new appliances, attached garage, enclosed patio area, neighborly, garden community. \$1,250+ \$2,500 sec. dep. 626/355-0010.

SUNLAND room, immaculate hardwood floors, entirely new ba., furnished or unfurn., TV, VCR & linens provided; roomie shares driveway, laundry, kitchen, bathrm, utilities; priv. entry room opens onto quarter-acre yard, BBQ, vegetable garden, fruit trees, patio, storage in garage; nonsmoker, \$450. 951-9744/653-2575, Shannon, or itsypoo@yahoo.com.

SUN VALLEY house, 3 bd., 3 ba., 100% remodeled/landscaped, priv. backyard w/pool, absolutely gorgeous, \$1,850. 310/308-2459.

Real Estate

SIERRA MADRE home, 2-story built in 1989, stunning views of city lights & mtns., backs to open space, 3 bd., 2 1/2 ba., 2,403 sq. ft. updated throughout w/newer roof, flooring, lighting, appliances, paint; huge master suite, fireplace, patio; oversized 2-car garage; see slideshow at www.timcragoe.com under properties/new listings; \$699,000. 626/229-2210.

Vacation Rentals

BIG BEAR LAKEFRONT luxury townhome, 2 decks, tennis, indoor pool/spa, nr. skiing, beautiful master bd. suite, slps. 6, 949/786-6548.

CABO SAN LUCAS, 5-star resort on the beach, 1 bd., sleeps 4, a/c, 2 pools, tennis, restaurant & bar on site, short walk to town & other nearby activities, \$600/wk. before July 30; info at clubcascadas.com: 368-8649 or tcfs@aprelx.com.

CAMBRIA house, ocean front, exceptional white water view, accom. up to 4 people, all amenities provided. 702/256-1359, creynolds2@cox.net.

FLORIDA, New Smyrna Beach, fully furnished condo, 2 bd., 2 ba., full kitchen, half-hour to Cape Canaveral, quiet, relaxing, overlooking beach; BBQ, pool, game rm., great ocean view, easy walk to stores and restaurants; sleeps 6; weekly or monthly. 909/981-7492, Darlene or dfhauge@yahoo.com.

GREEN VALLEY cabin on lake near Big Bear, furnished, 1 bd., 1 ba., large living room, sleeps 6, cable TV, fully equipped kitchen, fenced patio, lake fishing, beach, \$100/nt. 949/859-2237, 323/256-1031.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, dv, pool, priv. lanai, slps. 4, laundry fac., low season rate \$115/nite/2, high season rate \$130/nite/2, \$15/nite/add'l person. 949/348-8047 or jackandrady@cox.net.

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

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