Universe

Jet Propulsion Laboratory

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Opportunity knocks, enters orbit

Second Mars rover on its way to a Jan. 25 landing

By Guy Webster

NASA launched its second Mars Exploration Rover, Opportunity, in the evening of Monday, July 7, aboard a Delta II launch vehicle whose bright glare briefly illuminated Florida Space Coast beaches.

Opportunity's dash to Mars began with liftoff at 8:18 p.m. Pacific time from Cape Canaveral Air Force Station.

The spacecraft separated successfully from the Delta's third stage 83 minutes later, after it had been boosted out of Earth orbit and onto a course toward Mars. Flight controllers at JPL received a signal from Opportunity at 9:43 p.m. Monday PDT via the Goldstone, Calif., antenna complex of the Deep Space Network.

All systems on the spacecraft were operating as expected, reported JPL's Richard Brace, Mars Exploration Rover deputy project manager.

"We have a major step behind us now," said Project Manager Pete Theisinger. "There are still high-risk parts of this mission ahead of us, but we have two spacecraft on the way to Mars, and that's wonderful."

NASA Associate Administrator for Space Science Dr. Ed Weiler said, "Opportunity joins Spirit and other Mars-bound missions from the European Space Agency, Japan and the United Kingdom, which together mark the most extensive exploration of another planet in history. This ambitious undertaking is an amazing feat for Planet Earth and the human spirit of exploration."

Two days after launch, NASA announced that Opportunity had successfully reduced its spin rate as planned and switched to celestial navigation using a star scanner.

Prior to the July 9 maneuver, Opportunity was spinning 12.13 rotations per minute. Onboard thrusters were used to reduce the spin rate to approximately two rotations per minute, the designed rate for the cruise to Mars. After the spinning slowed, Opportunity's star scanner found stars that are being used as reference points for spacecraft attitude. One of the bright points in the star scanner's first field of view was Mars.

All systems on the spacecraft are in good health. As of July 10, Opportunity has traveled 6.6 million kilometers (4.1 million miles) since its July 7 launch. The Mars Exploration Rover flight team at JPL is preparing to command Opportunity's first trajectory-correction maneuver, scheduled for July 18.

Opportunity's twin, Spirit, also continues in good health on its cruise to Mars. As of July 10, it will have traveled 82.6 million kilometers (51.3 million miles) since its June 10 launch.

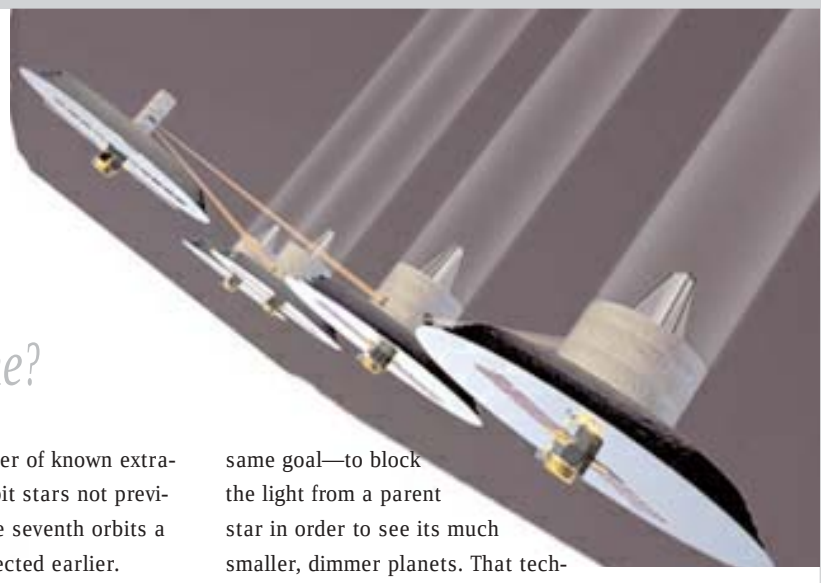
Opportunity is scheduled to arrive at a site on Mars called Meridiani Planum on Jan. 25, 2004, Universal Time (evening of Jan. 24, Eastern and Pacific times), three weeks after Spirit lands in a giant crater about halfway around the planet. JPL's Mars Global Surveyor orbiter has identified deposits at Meridiani Planum of a type of mineral that usually forms in wet environments. Both rovers will function as robotic geologists, examining rocks and soil for clues about whether past environments at their landing sites may have been hospitable to life.

For more information on the mission, visit *http://mars.jpl.nasa.gov/mer.*

Left to right: Bill Bensler, Grace Tan-Wang, Andrew Makovsky and Saina Ghandchi view Opportunity launch in Building 230.

Terrestrial Planet Finder concepts selected

Where did we come from? Are we alone?



The Terrestrial Planet Finder mission seeks to answers these questions as part of NASA's Origins Program, a series of missions to study the formation of galaxies, stars and planets, and to search for life elsewhere in the universe.

It may seem hard to believe now, but until 1995, there was only one known solar system—the one we live in. Since then, scientists have discovered indirect evidence for more than 100 planets orbiting other stars, suggesting that there may be untold numbers of planetary systems. To date, the existence of such planets has been inferred primarily by careful observations of the periodic motions of their parent stars resulting from the gravitational pull of the orbiting planets. Furthermore, these planets are not Earth-like but rather are very massive bodies orbiting very near the stars.

Astronomers and planetary scientists are keenly interested in directly detecting planets by observing and characterizing reflected or emitted light from them and finding out whether there may be planets like the Earth and capable of harboring life. Thus the excitement is building in anticipation of NASA's Terrestrial Planet Finder mission, managed by JPL.

Just last week European astronomers announced the discovery of seven new planets orbiting other stars, bringing to approximately 115 the total number of known extrasolar planets. Six of the new planets orbit stars not previously known to harbor planets, while the seventh orbits a star where another planet had been detected earlier.

In another recent discovery, British astronomers, working with Australian and American colleagues, have discovered a planet similar to Jupiter in mass, circular orbit and distance from its parent star, HD 70642, which is very like our own Sun. Among the 100 found so far, this system is the one most similar to our solar system.

"Most of the systems found so far with very massive planets close to the central star are not places we would expect to find Earths," said Terrestrial Planet Finder Project Manager Dan Coulter. "The exciting thing about the HD 70642 system is that it shows there are systems similar to our own out there where TPF might find something very interesting."

As part of its quest to find Earth-sized planets around stars and look for telltale chemical signatures of life, NASA has chosen two mission architecture concepts for further study and technology development for the Terrestrial Planet Finder mission.

The two architectures being explored for the mission are an Infrared Interferometer and a Visible Light Coronagraph. Each would use a different means to achieve the same goal—to block the light from a parent star in order to see its much smaller, dimmer planets. That technology challenge has been likened to finding a firefly near the beam of a brilliant searchlight from far away. Additional goals of the mission would include characterizing the surfaces and atmospheres of newfound planets, and looking for the chemical signatures of life.

The Infrared Interferometer is made up of multiple small telescopes on a fixed structure or on separated spacecraft flying in precision formation would simulate a much larger, very powerful telescope. The interferometer would utilize a technique called nulling to reduce the starlight by a factor of 1 million, thus enabling the detection of the very dim infrared emission from the planets.

The Visible Light Coronagraph is a large optical telescope, with a mirror three to four times bigger and at least 10 times more precise than the Hubble Space Telescope, and would collect starlight and the very dim reflected light from the planets. The telescope would have special optics to block the starlight and reduce the scattered or diffracted light by a factor of 1 billion, thus enabling astronomers to detect the faint planets.

The Terrestrial Planet Finder project selected the two

Continued on page 4

News Briefs

Dutch Slager / JPL Photolab

Dr. William Pickering, Lisa Phillips and Melissa Banks.

Pickering hosts NZ students

Retired JPL Director DR. WILLIAM PICKERING recently stopped by JPL to host the winner of an essay contest for high school students in his native New Zealand.

New technologies was the subject of the contest, sponsored by the Institution of Professional Engineers in New Zealand. Part of the prize for the winner was an all-expenses paid trip for two to California, which included the meeting with Pickering and a tour of JPL.

Contest winner LISA PHILLIPS was joined by her guest, MELISSA BANKS.

Quest spots near-Earth asteroid

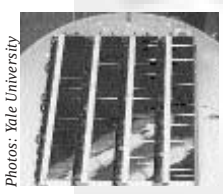
NASA astronomers in pursuit of near-Earth asteroids have already made a discovery with the newly installed Quasar Equatorial Survey, or 'Quest,' camera mounted in mid-April on Palomar Mountain's 1.2-meter (48-inch) Oschin telescope.

"The Quest camera is still undergoing commissioning trials," said DR. STEVEN PRAVDO, project manager for the Near-Earth Asteroid Tracking Project at JPL. "But that doesn't mean we can't do some real science in the meantime. What we found was a near-Earth asteroid, estimated to be about 250 meters (820 feet) in size."

The detection of the near-Earth object, 2003 NL7, occurred on the evening of July 8. It has been confirmed by follow-up measurements from three other observatories and subsequently certified by the official clearinghouse of the solar system's smaller inhabitants, the Minor Planet Center. While 2003 NL7 has been labeled a near-Earth asteroid, it is considered non-hazardous, with a 2.97-year orbit of the Sun in which its closest approach to Earth's orbit is about 25.1 million kilometers (15.6 million miles).

The Quest camera is being developed as a multi-purpose instrument by Yale and Indiana universities with DR. CHARLES BALTAY, chairman of Yale's physics department, as the principal investigator. It is designed for use in detecting and characterizing quasars, near-Earth asteroids, trans-Neptunian objects, supernovas, and a large variety of other astrophysical phenomena, by scientists from Yale, JPL and Caltech. The complex camera consists of 112 electronic chips known as charged coupled devices (CCDs) arranged over the Oschin telescope's focal plane. This gives the Quest camera 161-megapixel capability. By comparison, a good store-bought digital camera would probably be in the four-megapixel range.

"When Quest becomes operational, it will be a significant advancement for the Near-Earth Asteroid Tracking team," said Dr. RAYMOND BAMBERY, NEAT principal investigator. "We expect the new camera to increase the efficiency of detection of near-Earth asteroids by some three to four times that of the camera it replaced. This will make a major contribution to NASA's goal of discovering more than 90 percent of near-Earth objects that are greater that 1 kilometer (.62 mile) in diameter by 2008."



Photos: Yale University

Quest camera CCD array

Quest camera internal wiring harness.

Facilities to open service center

A new service center is being developed by Facilities to better serve the JPL community. The site will be used to request office relocations, modular furniture installation, and office amenities such as white boards, etc.

Beginning Aug, 1, the site will be available in the Services module of the JPL Employee Tool Kit (available at *http://nbs)*. The existing Facilities Services site will continue to be used for requesting rearrangement and modification of JPL buildings, engineering and design services, locksmith requests and equipment moves. For Maintenance Services, call ext. 4-4933.

Blood drive coming in August

JPL Occupational Health Services says the Red Cross is experiencing a critical shortage of all types of blood, and is appealing to all eligible donors for the next blood drive, to be held in von Kármán Auditorium on Aug. 12 from 10 a.m. to 4 p.m. and Aug. 13 from 7 a.m. to 1 p.m.

Signup is available on the Occupational Health Services website at *http://eis/medical/blood_form.html,* and advance signup sheets will be available in Building 310-202 prior to the blood drive. For last-minute signups, or to change your appointment, call the Red Cross at (626) 960-6956, ext. 225.

According to Occupational Health Services, the two-day blood drive in May yielded 172 pints of blood, from which 516 lives will benefit. This was an increase from the February collection of 157 pints of blood.

For more information, visit *http://www.redcross.org/services/biomed/blood/supply/tse.html.*

Software course July 23, 30

A Quantitative Software Management course (formerly known as Software Cost & Schedule Estimation) will be offered Wednesday, July 23 and Wednesday, July 30, 8 a.m. to 4:45 p.m., in the T1705 conference room.

Day 1 trains project element managers and cognizant engineers in how to track task progress using an Excel-based tool and how to use software metrics in managing their development activities. The class covers a variety of basic measures that can be used to monitor software development, including metrics for tracking growth and stability, resources and cost, schedule and progress, and quality.

Day 2 covers various aspects of software cost estimation and cost risk analysis as well as an instruction to using tools and processes that aid in performing these tasks. Topics include software estimating methods and models, software development estimation and metrics, cost drivers, rules of thumb, software productivity databases, and risk reduction and mitigation.

To enroll, visit *http://hr.jpl.nasa.gov/et* or call BRIAN VICKERS, ext. 3-0877.

NASA's new engineering, safety center

NASA has announced plans to create an independent Engineering and Safety Center at the agency's Langley Research Center in Hampton, Va., to provide comprehensive examination of all NASA programs and projects. The center will provide a central location to coordinate and conduct robust engineering and safety assessment across the entire agency.

"The new NASA Engineering and Safety center will have the capacity and authority to have direct operational influence on any agency mission," said NASA Administrator SEAN O'KEEFE. "When it comes to safety and engineering analysis, we need to improve our ability to share technical information, practices and talent, and independently ensure we are in the best position to achieve mission success."

The center is expected to draw on the talents of about 250 people throughout NASA and will report to former astronaut and current Langley Center Director ROY BRIDGES. BRYAN O'CONNOR, associate administrator for NASA's Office of Safety and Mission Assurance and also a former astronaut, will have policy responsibility for the organization. O'Connor's task will be to assure the effective use of all agency assets and expertise to derive the independent assessments.

Planned activities of the new organization include:

- Independent engineering assessment and testing to support critical NASA projects and programs;
- Engineering and safety review and evaluation through independent analysis, hazard and risk assessment, safety audit, and participation in mishap investigations;
- A central location for independent trend analysis utilizing state-of-the-art tools and techniques;
- A structure to support engineering collaboration for problem resolution;
- Central coordination of engineering and programmatic lessons learned, technical standards, and technical discipline expertise;
- Independent inspection and validation of activities to ensure the constant maintenance of NASA safety standards.

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 the Wellness Place, Building 167-111.

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.

Friday, July 18

TIAA/CREF Enrollment Meeting—This workshop at noon in Trailer 1720-137 is designed to assist employees newly eligible for the retirement plan with selection of investment options and the completion of enrollment forms.

Von Kármán Lecture Series—Robert Hogg, a robotics engineer in JPL's Mobility Systems Concept Development Section, and Brett Kennedy, task manager for the Limbed Excursion Mobile Utility Robot, will present "Searching and Crawling: A Few JPL Research Robots" at 7 p.m. in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. For more information, call Public Services at ext. 4-0112.

Wednesday, July 23

ACW Career Panel—Business careers is the topic for this discussion, one of five hosted this summer by the Director's Advisory Council for Women. Scheduled panelists are Annette Green (Section 2506), Cory Stevens (250), Diane Newmark (212), Jean Milbrandt (213) and Katrina Christian (219) at noon in the 167 conference room.

Career Fair—This event, sponsored by University Relations/Student Programs, will provide networking opportunities for students and will introduce them to the different areas of the Lab. It will be held from 11 a.m. to 1 p.m. in von Kármán Auditorium.

For more information, call Chris Klatka at ext. 4-8160.

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Debbie Llata at ext. 3-3690 for information.

Saturday, July 26

Caltech Folk Music Society—Guitarist Tom Smith will perform at 8 p.m. in Dabney Hall Lounge. Tickets are $15 for adults and $5 for children under 12. For more information, call (626) 395-4652 or check the Folk Music Society website at *http://www.folkmusic.caltech.edu.*

Monday, July 28

ACW Career Panel—Careers in project management will be discussed at noon in von Kármán Auditorium, one of five hosted this summer by the Director's Advisory Council for Women. Scheduled participants are Peg Frerking (Section 4034), Karla Clark (140) and Ginny Ford (383).

Tuesday, July 29

JPL Hiking+ Club—Rose Roberto of the JPL Library will present a slide show called "Cultural and Historical Sites In Peru and the Philippines" at noon in Building 238-543. Nonmembers are welcome.

Wednesday, July 30

Investment Advice—Fidelity representatives will be available for one-on-one counseling. For an appointment, call (800) 642-7131.

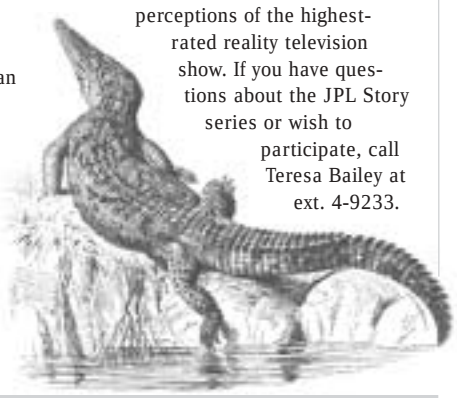
Volunteer Professionals for Medical Advancement—Meeting at 10:30 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Thursday, July 31

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

JPL Stories—Dave Johnson of Section 352 will describe his South American escapades earlier this year with "Survivor, the Amazon Adventure: Bikini Models, Gym Teachers, and 'Rocket Scientists,' Oh, My!" at 4 p.m. in the Library, Building 111-104.

Come hear Johnson's first-hand perceptions of the highest-rated reality television show. If you have questions about the JPL Story series or wish to participate, call Teresa Bailey at ext. 4-9233.



New maintenance contract signed

JPL has signed a new maintenance and operations services contract with All-Star Services Corp. of San Diego. All-Star Services was selected through a Source Evaluation Board, and replaces the outgoing service provider, Jacobs Engineering Remediation Technologies Inc.

Jacobs elected not to propose for this fixed-price contract when the Request For Proposal was issued in September 2002. All-Star Services was selected out of more than 50 interested parties.

"The Source Evaluation Board did an outstanding job in narrowing the candidate field and eventually recommending All Star Services," said Facilities Division Manager Bruce Fischer. "All Star is dedicated to maintenance and operations services and has a record of high customer satisfaction among their other clients."

All-Star started its transition program in June, and will actually begin providing maintenance and operations services on Sept. 17. The contract has a potential 10-year term based on contractor performance. The JPL community will be able to provide instant feedback of their satisfaction via web-based survey. Also, unlike and open-ended cost reimbursable contract, JPL now has a clear, defined cost for a 10-year period.

The new deal is a fixed-price maintenance and operations services contract. Unlike the Jacobs contract, which included some user-funded service request work, the new contract will concentrate only on maintaining and operating the physical plant of the Lab. User-funded service request work will be done by the Facilities Engineering and Construction Section's task-order contractors.

All-Star Services has indicated its intention to hire its workforce from amongst the incumbent workforce and subcontractors. They held an Open House for employees of the current Maintenance & Operations Services contract on July 9 at La Canada High School.

"We are happy to welcome the All-Star Services Team to JPL," said Facilities Maintenance and Operations Section Manager Vaji Nasoordeen. "We are looking forward to a successful partnership with improved maintenance and operations services for the JPL community."

High Spirit, Great Opportunity

With Opportunity's July 7 launch, both Mars Exploration Rovers are now on their way to the Red Planet, and team members wait with anticipation for two January landings. MER Project Scientist Dr. Joy Crisp discusses upcoming science team activities with Universe.

By Mark Whalen

How do the 150 members of the science team keep busy these days, in the months leading up to the landings?

In May and June, we completed a science process test and our first flight-like surface operations test. We have eight more operations tests to complete, some of which will be dual-mission simulations where one team is operating one test rover while a second team works the other test rover. The software that will be onboard the rovers is still being improved, along with the software we use on Earth to visualize the images and data from the rovers and to prepare the rover commands. Each operations test provides further training experiences and lessons learned that we will use to improve the next test.

Where does the MER mission fit in with your career so far? Was Mars always your goal?

I have a geology background, with a particular interest in volcanic rocks. My early studies were focused on Earth volcanoes. Soon after I came to JPL in 1987, I began studying Viking images of lava flows on Mars, measuring their dimensions and comparing them to models for lava flows on Earth to put constraints on the rocks' composition. For Mars Pathfinder, I served as the investigation scientist for the Alpha Proton X-Ray Spectrometer, which measured elemental composition of rocks and soil. I worked with the project engineers to make sure that rover design decisions and operations plans would enable the best science return possible from the spectrometer.

Mars was never my original goal, but I happened to be in the right place at the right time, and I'm glad I ended up becoming a "Martian."

Compare MER to Pathfinder.

The Pathfinder mission had a stereo camera on a mast, but it was fixed to the lander and it was used to image the local area and watch the Sojourner rover drive around. Sojourner put a total of 100 meters on the "odometer" but never strayed very far from the lander that had the communication system for receiving commands from Earth and sending the data back to Earth. Sojourner had three cameras and a simple device to deploy an Alpha Proton X-ray spectrometer onto specific rocks and soils. Meteorology instruments on the Pathfinder lander monitored wind, pressure and temperature. On MER, which is focused primarily on geology, our rovers are much larger and can go exploring much further distances. Each rover is outfitted with nine cameras, three spectrometers, a rock grinding tool, and a sophisticated robotic arm. The ability to carry this equipment tens of meters in a day and not be tied to a lander will allow us to go exploring and to seek out different kinds of rocks and soils for investigation.

Pathfinder had rather modest science objectives. MER is seeking to answer questions about past liquid water activity and past environments that may have been favorable for life. Landing site selection, science instruments calibration, and operations planning have all been done with the MER science objectives in mind.

Once they land, the rovers have a three-month mission. How much of a set schedule will you have? Or will it be day by day?

First of all, we'll be working on Martian days, called "sols," which are equivalent to 24 hours and 39 and a half minutes on Earth.

We have a fairly firm idea of what we want to do during the first six sols of the mission, which will include the rovers' health checkout and stand up, severing the connection between the rover and lander, an assessment of the options for driving the rover off the lander, and the acquisition of color stereo and infrared science panoramas. But even during those first few sols, we will be ready to adapt to off-nominal situations that could arise.

Beyond that, each day we will respond to what the rovers have accomplished and to what science we've learned, and prepare a set of commands for the rovers' next day's activities. In our operations tests, we're practicing the different kinds of typical rover activities that we can implement on Mars when the real science mission begins in January.

Could the findings of one rover affect the plans for the other?

Yes. This would most likely apply to the performance of an instrument. Insight or discoveries from science team members on one team might help the other team. One team might discover a technique for visualizing or interpreting the data that could benefit the other team, or a specific way to use an instrument that works well. The same thing could happen in the engineers' assessment of rover performance, with lessons learned by one rover team benefiting the other.

Based on what you know now about the sites, Gusev and Meridiani, what could you find that would prove the conditions for life once existed? On the other hand, would a specific finding disappoint you, in terms of ruling out water or life conditions?

Gusev is a crater that looks like it once held ponded water, and should contain lakebed sediments. We're going to look for minerals and rock texture clues to try to confirm that. Meridiani contains gray hematite, which on Earth usually forms in association with liquid water. We will look there for other water-formed minerals, and things like water-related features such as ripple marks and layers, to confirm our suspicions.

If we can confirm the signatures for past water, we'll want to know how long the water was there, whether it was warm or cold, and if that environment was favorable for life.

There are findings that could disappoint us with regard to past water activity on Mars, but we would still learn a lot about Mars geology. At Meridiani, if we're not lucky, we could find out that an originally magnetite-rich lava flow was oxidized at high temperature to form the hematite mineral signature, with no liquid water involved. An unlucky scenario for Gusev would be to find out that any lakebed sediments have been completely covered by wind-blown dust.

Will it be a challenge for team members to live on that Martian schedule?

The longer Martian sol means that two weeks after the rovers land, team members' wake-up and meal times will have shifted by about nine hours. So it certainly will be a challenge. We've consulted with experts on fatigue, who told us we will never fully adapt to that extra 39 and a half minutes each day. We just have to try to minimize the effects.

We did get some good advice, such as taking naps (not too long or too short), working shorter shifts—especially when working at night—and taking more days off. We're also going to have a "buddy system" to look out for each other, so we can honestly tell someone they look too tired to be working.

People have worked so long and so hard for this mission; they have to be convinced that they can't push their bodies too hard, or they won't perform at their best.

How exciting is this for you and the science team?

This is a thrill, and we can't wait for the rovers to drive around on Mars and look at rocks up close. We're set for the challenge to become geology "detectives" and read the clues in the rocks to figure out how they formed and whether the past environments were favorable for life.

Planet Finder

Continued from page 1

candidates based on results from four industrial-academic teams that conducted a 2-1/2 year study of more than 60 possible designs. The two architectures were determined to be sufficiently realistic to warrant further study and technological development in support of a launch of Terrestrial Planet Finder by the middle of the next decade.

"I can't imagine a more exciting or profound quest than searching for another planet like our own out there somewhere," said Coulter. "We're privileged that NASA and the American people have given us the opportunity to be part of it."

It is anticipated that one of the two architectures will be selected in 2006 to be implemented for the mission, which may include international collaboration. NASA and JPL will issue calls for proposals seeking input on the development and demonstration of technologies to implement the two architectures, and on scientific research relevant to planet finding.

For more information on the Terrestrial Planet Finder, visit *http://tpf.jpl.nasa.gov*. More information on the Origins Program is available at *http://origins.jpl.nasa.gov*. Additional information on JPL's planet-finding missions is available at *http://planetquest.jpl.nasa.gov*.

JPL'S ONLINE NEWS SOURCE

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

Passings

BILL HOLMAN, 88, a retired liaison engineer in Section 351, died May 22.

Holman joined JPL in 1945 and retired in 1980. He is survived by his wife, Dorothy, daughter and son-in-law Vicki and Dennis Smith, and three grandchildren.

Memorial services were held at Claremont United Methodist Church.

Bill Holman

Letters

I would like to thank the JPL family and Section 353 for the thoughtful gifts and support upon the passing of my Sister Clarice Niccoli on July 6 in Myrtle Creek, Oregon. Thanks to all of you for your kind thoughts and prayers.

William Neiderheiser

My family and I wish to thank our friends at JPL for their prayers and words of sympathy following the recent passing of my mother. Thank you for the contribution to the American Cancer Society in her memory and thanks to JPL for the beautiful plant.

Terry Fisher

Retirees

The following JPL employees retired in July:

Judith Castagno, 28 years, Section 273; Edward Greenberg, 19 years; Steven Morris, 17 years, Section 344; Alice Tangney, 15 years, Section 260.

Classifieds

For Sale

ART WORK, Salvador Dali print "The Quest," 58 of 300, aquatint hand-colored etching, printed in 1981, appraised at $1,400 in Feb. 1986, e-mail picture available, sell for $2,500/obo. 661/290-2892.

AUTOMOBILE PASS, for Canada's National Parks, expires 7/31/03, $5. 790-3899.

BASSINET, Graco 3-in-1 Bedside sleeper, changing table, rocker, music, vibration, light, used 6 wks., pd. $80, sell $45/obo. 682-6760.

BED, fancy antique, "Trailing Vine," brass/iron, ca. 1885, double, Indiana Iron Foundry, would make a terrific child's bed, $1,300/obo; DESK, secretary, antique "countinghouse," from Eastern shore Maryland, ca. 1835, cherry, long drawer in base w/turned legs and fitted interior, brass h/w dated 1878, $5,000/obo. 249-0453 betw. 5-9 or jkbonner@gte.net.

BIKE, Mongoose Toast BMX single speed, 20," front and rear hand brakes, brand new, $50. 502-0478.

CARD SHUFFLER, Johnson, collectible, all-metal construction with the exception of the friction wheels which drive the cards and the carved-wood dowel handles, stands ~6" handle-high, and ~9" by 6", flanges and handle inclusive, $35; PORT REPLICATOR, for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, $85; DIET TAPES, Jenny Craig, set of 14, $50. 790-3899.

COFFEE MAKER, Braun, 10-cups, white/black, like new, $30/obo. 626/791-6101.

COMPUTER DESK, lots of storage space and place for printer / CPU, $60. 243-8255.

COUCH, gray/blue w/oak/brass trim, $175/obo; DESK, white w/glass top and 3 drawers, $50/obo; moving, must sell before 8/1/03. 626/294-1927.

DOG HOUSE, Dogloo II igloo style w/vent in roof, outside dimensions about 36"x36", for medium-size dog, good cond., about 3 years old, $40/obo. 909/596-4390.

DOG HOUSE, Dogloo XT for small dog, up to 45#, good cond., $40. 626/303-1927.

FISHING GEAR: 1 Sportfisher 6-ft. trolling rod, 1 Garcia 2-piece 7 ft. tackle rod, 1 Fenwick 2-piece 8 ft., 3.5 oz fly fishing rod w/ Olympic reel, 1 telescoping Olympic 6-ft. rod w/Daiwa spinning reel, 1 telescoping 7-ft. fly fishing rod, 1 antique bamboo 7-section, 9-ft. fly fishing rod, 1 Gladding 820 spinning reel, 1 Daiwa 1500C spinning reel, 1 Garcia Mitchell 300 spinning reel, 1 K-Mart level wind trolling reel, 1 tackle box + misc. tackle, 2 fishing fly Tieing kits, sell all for $150 or separate; make reasonable offer. 626/963-5727.

FURNITURE: black leather chair, $150/pair; chair, leather, stainless steel tubular, $150/pair; loveseat, $60; ent. center, $75; cocktail table, 39" octagonal glass, $100; all items obo; HOUSEHOLD ITEMS; Maytag washer and dryer, $600; lawnmower, Honda hr215sxa, $300; trimmer, Echo SRM 2100, $100; blower, Echo PB1000, $100; chainsaw, McCulloch 16" electric, $40; pole pruner, $25; rug, black/white, $75; aquarium, 60 gal., acrylic, w/stand, $180; 6' indoor fichus plant, $40. 246-2319.

GRILL, king-size Forman, white, $45/obo. 368-7861.

GUITAR PACKAGE, Fender Stratocaster Squier Series, exc. cond., barely used, red and white, includes hard shell case, Crate GX-15 amp, 10 ft. Pro Co Music Mover cable, beginners book, and Tremolo Arm Whammy Bar, photo with ad at JPL Store, $350/obo. 846-1280, Nancy.

HEADBOARD, walnut, single, $20; CARD TABLE, folding, Samsonite, and 4 folding chairs, $50; SEWING MACHINE, built-in cabinet with chair and flip top, $70. 790-3543.

KID'S LOG CABIN, sturdy green plastic with brown doors and white fence, $110/obo. 805/493-4163.

LAPTOP COMPUTER, NEC Versa SXi PIII 650, 14.1" TFT, 12GB, 128MB (1 bank; 1 free), DVD, SuperDisk LS-120 (regular floppies plus 120MB optical disks), Li-ion battery, power adapter, vg cond., slim, nice-looking, dual boot Windows 98-Debian Linux 3.0 (latest), DVD software for watching movies under Win incl.; http://support.neccomp.com/hardware/notebooks/versasxi/, $570. albertobig@libero.it.

MATTRESS SET, queen size, 3 yrs. old, incl. mattr., box spring, frame, all exc. cond., price reduced to $250, free bedding w/purchase. 626/644-3453 or rocketgal99@hotmail.com.

PIANO, antique, good cond., upright, 1923, $600/obo. 242-4402.

POOL TABLE, 8 ft., all accessories + 10-cue corner rack, light bar, and spill-proof table cover; exc. cond., $950/obo/for all; FISH TANK, 40 gal., w/black stand, incl. pumps, heater, etc., $150/obo. 626/405-9701, leave message.

PUPPIES, English Bulldogs, 8 weeks, males and females, ~$2,000. 626/255-5306.

REFRIGERATOR, Frigidaire, top freezer, , 18.6 cu. ft., adjustable sliding shelves, fruit/veggie/snack drawers, separate controls, energy saver switch, very clean in & out, vg cond, $170. 626/398-0921.

REFRIGERATOR, Kenmore, top of the line; 35.5" W x 68.5" H x 31" D; exc. cond.; auto ice maker, water spigot; avail. 7/31; $250/obo. 249-0453 betw. 5-9 or jkbonner@gte.net.

SOFA / SLEEPER, w/deluxe mattress, 4 yr. old, exc. cond., 84", truffle color, $750/obo. 248-1793.

SOFTWARE, PrintShop CD Label Creator, brand new in orig. box, Windows XP compatible, incl. device for applying labels to the CD, $10; COMPUTER POWER CONTROL CENTER, 5 power switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, $20; ORGAN, Yamaha 415 electronic organ w/13 pedals, 3 keyboards, 144 rhythm patterns, $2,000. 790-3899.

STEREO, vintage hi-fi in walnut cabinet 17" x 49", exc. cond., plays 33 1/3 record albums & 45s, AM/FM also, made by Silvertone, $100; OLD ALBUMS also. 952-7940.

STEREOPHILES, Rotel RB-985 5 channel, THX, 800W, power amp; Rotel RDA 980 digital surround adapter; Rotel RDP digital audio processor; Rotel RSP 980 surround sound processor, slight cosmetic blemishes but all in exc. working cond., orig. purchased at $2,500 +; will sacrifice all 4 pcs. for $875/obo. 249-9437, eves.

SYNTHESIZER KEYBOARD, KORG model X3 clean and in exc. cond., over 500 natural sounds plus 200 combination sounds, has a 16-channel sequencer to record your favorite compositions, $700/negotiable. 626/584-4614 or 632-0650, cell.

TEA SET, pottery, made by Maine artisan, nautical theme, matching lighthouse design on all pieces, incl. tea pot, creamer, sugar, platter, small serving bowl, 2 mugs, 2 Japanese tea cups, never used, $100/set. 249-4316.

TELEVISION, 19", color, w/remote, only 2 years old, $80/obo; ANTENNA, $8; STEAM IRON, $5; COFFEE MAKER, 2 years old, $6. 626/282-5815.

TOY WOOD CONSTRUCTION SET, Brio Mech Set 4, 152 pieces plus work board, very good cond., original cost ~$150, sell for $50. 626/303-1927.

TREADMILL, Image 10.6; 2.5 hp, 0-10 mph, 1-12% power incline, cordless pulse sensor, programmable, great cond., $500. 249-9534.

TREADMILL, ProForm Sears #585, spd. control, power incline, pulse rate, distance/speed/time indicators, exc. cond., $275. 626/355-9723, Neil or Pat.

TREADMILL, basic, with movable arms for upper body workout too, $125/obo; REFRIGERATOR, full size, side-by-side, great cond., white, $125/obo. 626/405-9701, leave message.

TREES: red banana plant 5' tall, $60/obo; fish tail, 6' tall, $80 obo; fichus, >10' tall, braided, in 30" plastic pot, $250/obo; ceramic bowl, gray, 2' diameter with planted geraniums, $40/obo. 626/791-6101.

WASHER/DRYER, Maytag washer, wht. approx. 6-7 years old, full size, works, Kenmore gas dryer, wht. rust spots on top, but works fine, new gas line incl. both $75, you pick up. 626/351-9483, Steve.

WEDDING GOWN, white duchess silk sheath by Amsale, low back, gorgeous detachable train, fit ~size 2 to 4 American, elbow length white tulle veil, $1,000/for set/obo. 249-4316.

WEIGHT BENCH, 45 lb. bar, curling bar, 45, 35, 25, 10 lb. + more plates, dip/push-up stand, abs bench, near JPL, $135. 790-6395.

Vehicles / Accessories

'01 AUDI A6 2.7T 6 spd. manual, silver w/black int., orig. owner, 50K mi., $22,000/obo. 626/396-4966.

'01 BMW Z3 3.0i Roadster, silver 21K mi., like new cond., "pampered" car, no accidents, pic. avail. upon request, $27,999/obo. 679-2622.

'00 BMW 323Ci Coupe, 24K mi., 2.5 liter/6 cyl. eng., black exterior, leatherette int., Steptronic auto trans., moonroof, premium pkg., 1 owner, mint condition, still under warranty, $24,000. 502-1282.

'96 BMW 328i, white w/light gray int., 4-dr automatic, a/c dual temp controls, pwr. seats/moonroof/windows, maintenance/trip onboard computer, keyless entry/alarm, sport pkg. w/upgraded wheels, very clean, super cond. in/out, 90K mi., $10,450/obo. 661/294-3857.

'87 BMW 528e, 4D, V6, good cond., metallic gray, 5 speed, manual, power doors, sunroof and more to see, 199K miles, runs great, $1,750/obo. 626/798-3658 or 626/791-6712.

'85 CHEVROLET Silverado Dually, 30 series, V8, 6.2 diesel, 150,000 mi., new tires, a/c, runs great, $4,800. 626/963-8288.

'80 DATSUN (NISSAN) 280ZX coupe, 5-spd. manual, blue/silver, grand lux. pkg., 139,000 miles, orig. owner, best offer. 626/577-8107.

'94 FORD Escort, blue, manual trans., a/c, CD, new Michelin tires, 130K, not a beauty but works perfectly, $2,000. 626/797-5488.

'00 HONDA Accord coupe EX, V6, 2 dr., 6 cyl. 3.0L eng., white, eng./ext/int in exc. cond., a/c, 4-spd A/T, AM/FM/CD, alum/alloy wheels, leather seats, keyless entry, climate ctrl., 4-wheel anti-lock brakes, c/c., garage dr. opener, pwr. door locks, pwr. mirrors(l/r), pwr steer., moonroof, pwr wind., rear spoiler & flr. mats, dual front & side air bags, lightly tinted wind., remote trunk release, 45K miles, $15,900/obo. 626/584-4537.

'94 MAZDA, MX6, red, black interior, sunroof, manual, 140,000 mi., good cond. $2,800/obo. 626/945-7040, Alex.

'84 MERCEDES BENZ 190 E, 2.3, silver, blue lthr. int., pwr. win, doors, sunroof., a/c, 136K mi., clean car ,$4,000/obo. 626/967-4802.

'96 MITSUBISHI Eclipse GS-T, 2 dr. hatchback, 4 cyl., turbo, a/c, standard, 110K, 1 owner, runs great, no accidents, gd. mileage, well-maintained, pwr. sunroof/ locks/windows, 10 CD changer, $6,500/obo. 626/296-1810 or meyoung@sbcglobal.net.

'95 NISSAN Pathfinder XE, 4 x 4, loaded, LoJack and security syst., V6, new tires, tow package, 135K mi., $5,900. 909/596-9007.

'92 NISSAN Maxima, burgundy, moonroof, a/c, stereo w/CD, power antenna, dash and car cover, vg cond., $3,600/obo. 909/225-2323.

'98 PONTIAC Sunfire, great running cond. 626/858-0742.

'87 TOYOTA Cressida, power accessories, a/c, good cond., $1,950/obo. 952-1518.

Wanted

CARPOOLER, from Chino Hills/Diamond Bar area, work schedule 9:15 a.m.- 6 p.m., non-smoker. 4-1753.

COMPANION/DRIVER, energetic, teen/college age, to lead day trips & activities with 2 Altadena boys, 12 & 13, to beach, museums, parks, etc.; needed Mon-Fri for all or part of July 28 through Aug. 22, flexible schedule. 626/797-6824.

ROOMATE(S), male preferred, to share apt. or house, non-smoking. 281-2494, Alex.

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

VOLLEYBALL PLAYERS, coed, no beginners please, Tuesday nights 8 to 10 at Eagle Rock High School, $4/night. 956-1744, Barbara.

Free

PRINTER CARTRIDGE, Apple Laserwriter model M1960 G/A. 626/286-2752.

SHOWER DOORS, two pairs used chrome trim frameless glass, 57" opening x 57" tall with all mounting hardware. 246-2319.

Lost & Found

LOST: Medium-to-large black knit wool long-sleeve sweater, zip-up front, V-neck. Ext. 4-1176, Rob.

Editor's note: A Lost & Found is also available at the JPL Store.

For Rent

ALTADENA, room in 3 bd., 2 ba., beautiful cyn home, share w/2 Caltech-affiliated friends, steep but short mtn. bike ride to work, fantastic backyard that abuts Nat'l Forest, cable modem, relaxed living environment, $550 and 1/3 util. 653-6140.

ALTADENA, 3 bd., 2 ba., view home, min. from JPL, borders Angeles Nat'l Forest & trails, furn. incl refrig., stove, extra freezer, washer/dryer, 2-car garage with workshop, spacious living/dining areas, fireplace, courtyard, shaded patio, fruit trees, English garden, quiet $2,200 + util. 626/798-3235, Lori.

ARCADIA apt, 2 bd.+den, 1 ba., garage, remodeled, refrigerator/washer/dryer in unit, a/c, dishwasher; spacious. walking distance to shops, exc. neighborhood, no pets, water/gardener/trash included, $1,350. 626/576-7333.

GLENDALE, townhome-like duplex, 2 bd., 1.5 ba, din. rm., liv. rm., private patio, marble flr., family neighbrhd., close to JPL, $1,300. 246-7365, Rose.

GLENDALE house, 3 bd.,1 ba, din. rm., liv. rm., priv. patio & garden, family neighbrhd., close to JPL, $1,600. 246-7365, Rose.

HACIENDA HEIGHTS, 2 bd., 2.5 ba., detached condo, beautiful yard, upscale neighborhood, convenient to local school/shops/community services, avail. last week of July, prefer non-smoker, no pets. $1,400. 281-9676, Charli, or Charlie561@aol.com.

PASADENA apt., share 2 + 2 + loft in luxury complex near Colorado and Lake, living and kitchen fully furn., DSL/balcony/pool/jac/gym, $750. 626/644-5431, Gary.

PASADENA, spacious home for lease, 3 bd., 2 ba., lr +fireplace, family rm., d/r, 2,300 sq. ft., w/lg. attic (1,000 sq. ft.) suitable for storage, generous yard (1/4-acre lot) with fruit trees and water feature, 2 miles from JPL, $2,350 includes gardener and water. 626/794-7979.

PASADENA, large 3 bd., 2.5 ba., 2-story townhome, lg. kitchen, patio, vaulted ceilings, fireplace, carpeted living room, central air/heat, fridge/washer/dryer in-unit, quiet; water, trash and landscaping incl., assoc. pool, hot tub and sauna; close to JPL and Caltech, walking dist. to Old Town/Goldline/Metro, partially furn., avail. 9/1, $2,000. 626/644-5699, Lucas.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beauty. inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy LR w/FP, end unit, frml DR, hdwd. flrs., immac. cond., close to schls. $1,750. 626/396-9024.

PASADENA, townhome-style apts., 2 bd., 1.5 ba., patio, dishwasher, central a/c, new carpet & floors, laundry, parking, avail. Aug., furnished $1,375, unfurn. $1,325. 626/429-3677.

SAN MARINO house, 3 bd., 2 ba., 2-car garage w/automatic opener, newly painted, remodeled kitchen, dishwasher, a/c, laundry hookups, fireplace, spacious family rm. overlooking yard, no pets, exc. neighborhood & school district, $3,000. 626/576-7333.

SIERRA MADRE townhouse to share w/Caltech alumna, 1,000 sq. ft. apt, lg. patio, 2 bd., 1.5 ba., quiet st., garage parking, washer/dryer $605 + 1/2 utils. 626/355-4838, Heather.

TUJUNGA, small 1 bd. guesthouse, on secure and private 3/4 acre w/lg. trees and city/mtn. view, 15 min. from JPL, has storage shed, W/D, rose garden, patio, fruit trees, and car port, $825 includes utilities. 952-7980, Ann.

Real Estate

ALPINE FOREST, 3.2 acre view lot, just 25 min. from Tehachapi, property sits among pine and oak trees at 6,300 ft. elevation, 4 seasons are part of the enjoyment, buildable for a vacation retreat or secluded home site, property ass'n is responsible for road maintenance and security, gated w/guard, closest neighbor is 3/4 mile, $40,000. 249-6071.

Vacation Rentals

BALBOA ISLAND, cute beach apartment, fully furnished 2 bd., 1 ba., patio, washer/dryer, parking, sleeps 5, steps to bay, available weekly July & August, $1,200-$1,500/week depending on week. 626/351-9641.

BIG BEAR LAKEFRONT, luxury town home, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

ESCONDIDO, golfers' paradise, Lawrence Welk Villa timeshare, fixed week #23 w/high RC / trading value, Wild Animal Park/Zoo/Sea World closeby, spacious 1,600 sq. ft., 2 bd., 2 full ba., all amenities, incl. cathedral vaulted ceiling & outside veranda overlooking a beautiful 18-hole golf course, $17,000. 249-6071.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., Low Season rate $105/nite/2, High Season rate $120/nite/2, $15/nite/add'l person. 949/348-8047, or jackandrandy@cox.net.

HAWAII, Pono Kai resort on Kauai, 30 August to 6 September, $800. 957-3675.

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 disc. 626/798-9222 or 626/794-0455 or valerie@gps.caltech.edu.

OCEANSIDE condo, fully furnished, 2 bd., 2 ba., fireplace, full kitchen, quiet, relaxing, beautiful beachside setting, with barbeque, pool, spa, game room, and great ocean view, easy walk to pier and restaurants, sleeps 8, available weekly or monthly. 909/981-7492, Darlene or dfhauge@yahoo.com.

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

'01 PACE ARROW 34-foot RV, queen bed, sofa bed and dinette bed, monthly rentals only, you pay insurance and gas, JPL employees only, no smoking or pets, $4,000 in advance plus $1,000 security deposit. tahoemike@earthlink.net, 530/525-7334.

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.