

Sorry, Junko
and Bets.
Next time, I
promise.

THE SUMMER CALIFORNIA TECH

Special
Cross-country
Preview issue

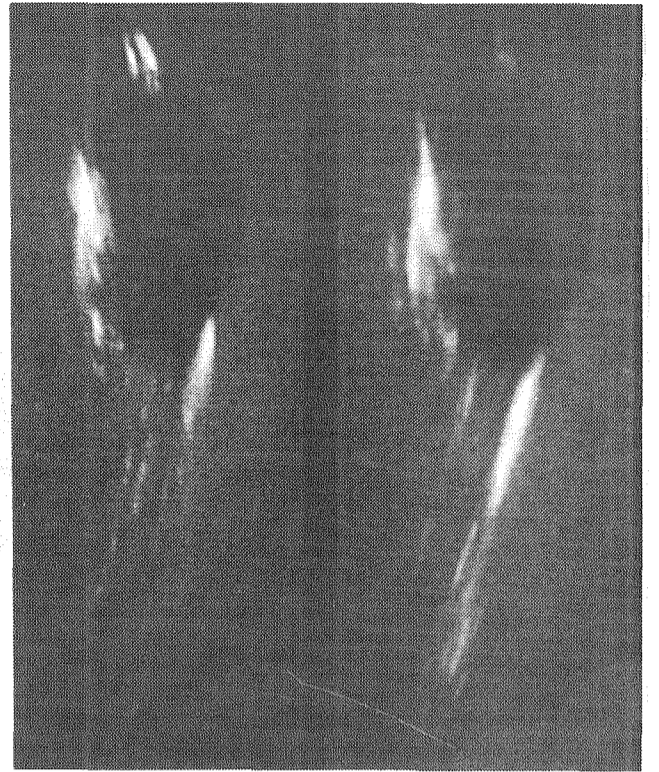
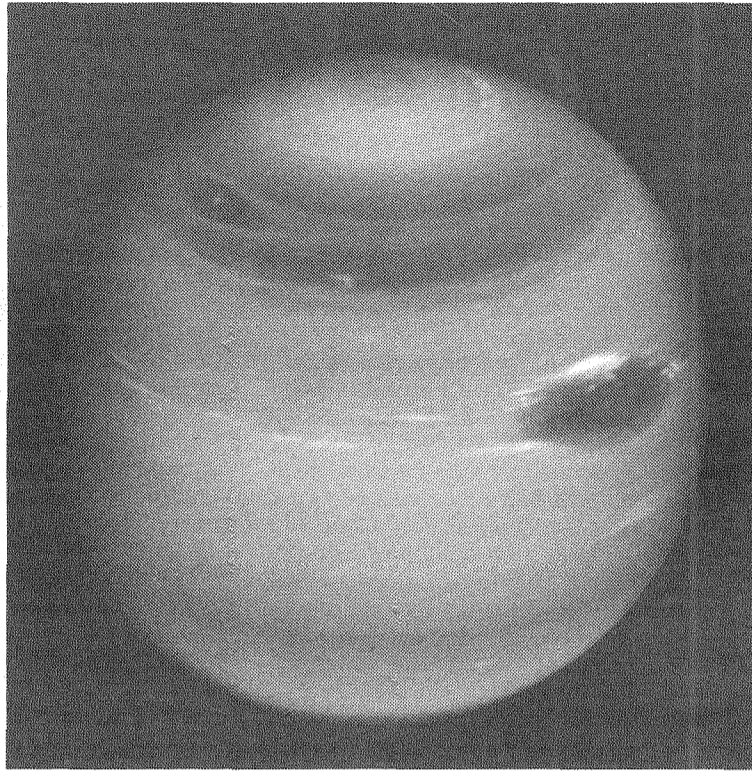
Volume XCI, Number iii

Pasadena, California

August 23, 1989



Ed Stone, Neptune, and the Great DarK Spot



photos courtesy of JPL

Ed Stone: Voyager Project Scientist

by Brian Lemoff

Tomorrow, at 9:00 pm PDT, Voyager 2 will make history as it passes just 3000 miles above Neptune's cloud tops. The encounter comes twelve years and 4 days after the spacecraft was launched from Kennedy Space Center. The Voyager project, however, began in 1972, five years before launch, when NASA first gave the go ahead. The man who has overseen the scientific aspects of the Voyager missions since the very beginning is Voyager Project Scientist, Ed Stone.

Stone, a physics professor, is Caltech's Vice President for Astronomical Facilities. Voyager's scientific team is composed of over 120 scientists from all over the nation. These scientists are divided into eleven teams: imaging (optical frequencies), infrared, ultraviolet, photometry, radio science, magnetic field, plasma, low energy charged particles, cosmic ray, plasma wave (10 Hz to 60 kHz), and radio astronomy (over 60 kHz). Each team has a principal investigator, and together, the eleven principal investigators form the scientific steering team. As Project Scientist, Dr. Stone acts as the chairman of the steering team. Stone is also the principal investigator for the cosmic ray team.

According to Stone, the job of Project Scientist is threefold. As chairman of the steering team, Stone must mediate between eleven principal investigators, each of whom would like his particular experiment to be given top priority. Because of engineering constraints, not every experiment on the spacecraft can be as complete as scientists would like. It is Stone's responsibility to understand the constraints and to allocate space and time to the different experiments.

A second responsibility of the Project Scientist is to oversee the daily scientific operations at JPL. Because the 120 scientists are scattered all over the country, they are not available to answer questions which the JPL flight staff might come up with from day to day. Thus, Stone must understand all of the experiments aboard Voyager

well enough to represent the entire scientific team to JPL on a daily basis.

Stone's third responsibility as Project Scientist, is to serve as liaison between the Voyager scientific team and the rest of the world. Stone must be able to communicate the intentions and findings of the scientists to audiences of all levels of understanding. Near the time of an encounter, this means a continuous stream of press conferences and interviews.

According to Stone, in the seventeen years that he has been involved with the project, there have been no major setbacks or delays, and only a handful of moderate frustrations. One such frustration came in 1973, when the Voyager spacecraft were already well into the design phase. Because no experimental data had until then been available on the radiation which the Voyagers could expect to encounter, the craft had to be designed according to scientists' best estimates. Data from the recently launched Pioneer 10 revealed that scientists had underestimated the amount of radiation by a factor of 1000. Thus, major modifications had to be made in the Voyager design, causing a delay of a few months. Once the craft had been redesigned, everything went according to schedule. The craft were built during 1975 and 1976, and they were launched in August (Voyager 2) and September (Voyager 1) of 1977.

During the first few months after launch, Stone recalls that the flight staff had some degree of difficulty learning to control the complicated pieces of machinery that had been so skillfully designed. One example had to do with attitude control. The spacecraft had been programmed with a failsafe mechanism to prevent it from rotating too rapidly. The flight staff found that every time they told Voyager to roll, it would activate the failsafe and cancel the command. The problem was corrected by a simple reprogramming, but many were concerned that an endless number of similar problems would continue to dog the mission.

In response, NASA greatly in-

continued on page 2

Spectacular Fall Sports Preview

Cross-Country

by Scott Kister and Chris Campo

It's already late August, and the god-awful, fire-belching, rip-roaring Caltech cross-country team is undergoing intensive training. Each piece is preparing itself to become a part of the well-oiled, highly efficient Caltech Running Machine (CRUM).

The other SCIAM teams have lost their star runners: Oxy lost Tregillis, Claremont Mike Scott, Redlands Troy Brown, and Whittier Mike Lee. Meanwhile the Beavers return their top five runners, plus world famous triathlete Mark Lytle will be rejoining the team!!

Dan 'Terminator' Flees has stated "I'm going to demolish Jason Tufts. That Redlands guy actually beat me at conference last year. He's TOAST!" Juniors Scott Kister and Chris Campo both set PRs during the OFF-SEASON, without using any of our incredible coach's training schedule. Mark 'Mauler' Lytle has left a bloody trail of beaten runners on the summer road racing circuit and at the national biathlon tournament.

Paul 'Pavement Pounder' Socolow has concentrated on not overtraining, saving all his energy for delivering fatal blows to his SCIAM opponents once the season arrives. Mike 'Harry Monster' Mahon vowed to train this summer

in the sizzling heat of the Florida sun. We're confident he'll come back and run his opponents ragged.

Each of the last four classes have produced at least two awesome freshman, and this athletic class should be no exception. The season of revenge begins September 16 with an invitational meet at Whittier. The first home meet is September 30.

Come watch the team because the Caltech machine can't be stopped; can't be beat. We're not taking any prisoners this year. SCIAM conference, look out, Caltech is intense and out of control!

Water Polo

by Al Fansome

The key word for the upcoming water polo season is shit. The only question is just how shitty? Will we be as bad as the basketball team will be? Sadly enough, maybe. We were bad last year. And for this year we lost our goalie, Tim Hochberg, and several key players: Graham Gitlin, Dave Amezza, and Jordan Holt. To add to this, it's not looking like the frosh are gonna provide any replacements. The only one coming in who has touched a water polo ball is a Bangerter, so he has decided to play soccer.

For the upcoming season, we still have me. I can swim, but I suck at polo. Tamaki Murakami will be kicking some butt. He's been playing this summer, and I must say he's looking mighty cute in his swimming suit. Doruk Engin and Chris Daugberg will get wet, and Karin Johnson said that she has been practicing this summer.

The two big question marks are Brian Shim and Tim Maddux. Captain Brian never bothered to drag his lazy ass down to one of our summer games, so we're all curious as to how he spent his summer. Tim has been swimming and bulking up all summer, and he's looking more and more like Bruno every day. Scary.

Anyway, we're all looking forward to a season filled with...uh...improvement.

CRIME AND INCIDENT BEAT

- 8-1 Group of SSSSP students caught in Millikan reflecting pool. Students were told to leave. Fire alarm pulled by unknown summer students outside Room 129 in Ruddock House.
- 8-2 Bicycle stolen from rack at Catalina Apt 203. Bike was chained and locked. Vandalism- Truck windshield broken in Chester parking lot.
- 8-3 13 year old boy caught selling candy door-to-door in Catalina III complex. Security turned the boy over to the Pasadena Police.
- 8-4 13 year old knocked from his bike at California and Wilson. His bike was taken from him by 5 male Hispanics riding bicycles. The bike was a Peugeot valued at about \$500. Two male black teenagers were spotted leaving Page House carrying a smoke detector. When approached by security, suspects tried to throw detector into nearby bushes. Security officer retrieved detector, and held suspects until Pasadena Police arrived to take them away.
- 8-5 Front hubcaps stolen from vehicle parked in West Wilson lot.
- 8-8 Unicycle stolen from Prexy stairwell in Ricketts House.
- 8-9 Unknown person(s) punched hole in window of Room 070 Mudd and stole a Celestron Model 90 Telescope.
- 8-14 Bike stolen from rack on the south side of Lloyd House.
- 8-16 Smoke detector broken in Ruddock House. May have been the work of frisbee players.
- 8-17 Victim found note on windshield of his vehicle- 'U better stay away from Maria's and kids or u gonig dead meat.'
- 8-18 Apple Laserwriter stolen from Room 85 Alles Building. Backpack stolen from front of Brown Gym. Five-speed bike stolen from railing between Sloan and Bridge, where it had been chained and locked. Macintosh computer stolen from Room 353 Crellin. Two lab books, Walkman radio, and frequency counter stolen from Room 2 Thomas Lab.
- 8-19 Watchman TV, battery chargers, boxes of 3M diskettes stolen from 320 Church.

from page 1

creased Voyager's flight staff, and after a few months, the staff felt confident in their ability to control the spacecraft. They only other serious problem that Stone recalls occurred following Voyager 2's encounter with Saturn. During this encounter, the scan platform, which adjusts the pointing of Voyager's cameras, became jammed on one axis. Luckily, engineers had five years before the Uranus encounter in which to correct the problem. The problem was corrected within a year. Stone grins when he compares Voyager's smooth ride with NASA's more recent and more trouble ridden projects.

Stone expects Voyager to con-

tinue for another 25 to 30 years. One of three factors will probably end Voyager's useful life: The plutonium level will drop sufficiently low to cause the electrical system to fail; The hydrosine which steers the spacecraft will be used up; and the sun will become too dim for Voyager to home in on, preventing the spacecraft from pointing their antennae towards earth. All of these should occur sometime around the 30 year mark. Until then, both Voyagers will continue to relay valuable information back to earth regarding the sun's magnetic field.

Although the Voyager project will not be over after Neptune, it will occupy much less of Dr. Stone's time. In the next two years,

most of Stone's time will be devoted to the completion of the Keck telescope, under construction on Mauna Kea, in Hawaii. Stone is the Chairman of the Board of Directors of the California Association for Research in Astronomy, which is building and will operate the telescope. The telescope will be the largest optical telescope in the

world and should be completed by 1991.

Stone is also involved with cosmic ray experiments that will be carried on Gallileo, SAMPEX (a satellite which will be in a polar orbit about earth), Astro-Mag (a superconducting magnet to be put in orbit in about 10 yrs), and ACE (a solar probe).

Chris Is Pissed

Yeah, I'm pretty pissed alright. It really gets me steamed when assholes steal the front wheel off my new bike. I had locked the bike up outside Jorgenson where I went to work, and discovered upon leaving the building that the wheel was gone. Bad enough that I lost the wheel, but with it went the magnetic sensor pickup off of which my two day old cyclocomputer keys (it was attached to the front wheel).

Reflection upon the incident, and upon several similar episodes involving many of my friends during my years here at Caltech has lead me to consider a solution to the problem of thefts here. I propose forming a Lead Pipe Club.

If enough people are interested, and I'm sure there are, the club could get funding from ASCIT. Basically, the only operating cost of the club would be in its purchase of a number of sturdy lead pipes. The club activities would be as follows.

In a regular basis, members of the Lead Pipe Club would leave an

unlocked bike or a bike with an unlocked front wheel at some easily accessible location on campus. Members would then, each with a lead pipe in hand, proceed to hid themselves nearby and wait for someone to attempt to perpetuate a theft.

The object is then to descend on the would-be thief and attempt to be the first one to cave the side of the thief's head in with your lead pipe.

I'm not sure if most of the thefts on campus are the work of high schollers or older losers looting to sell hot stuff for drug money, but whoever they are they'll start getting the message when enough of their buddies pile up near bike racks on campus.

NEXT ISSUE: Chris spouts off about the houses. Featured: Blacker House dinner.

Editors note: The above views are soley those of Chris Campo, who is pissed. These views probably do not represent those of ASCIT.

Jacobi as Mad Byron

by Gavin Claypool

Los Angeles theatregoers will have a rare opportunity to see British actor Derek Jacobi on stage as the Ahmanson starts its first full season at the James A. Doolittle Theatre in Hollywood.

Jacobi stars in the title role of "Byron - Mad, Bad and Dangerous to Know," with Isla Blair as the many women in his life. The show opens tonight and runs through September 17.

Perhaps best known for his stunning work as the stuttering, twitching lead in "I, Claudius" some years ago, Jacobi has been seen most recently in the film adaptation of Charles Dickens's *Little Dorrit*. "Byron" was written and com-

plied by dramatist Jane McCulloch, who directs this production. Many of Byron's letters and poems are incorporated in the text, with some of them set to music.

Performances are Tuesday through Saturday evenings at 8 p.m. and Thursday, Saturday, and Sunday afternoons at 2 p.m. Tickets for all performances are \$31 for orchestra and mezzanine, \$25 for balcony.

The Doolittle Theatre, located at 1615 N. Vine St., between Hollywood Blvd. and Selma Ave. in Hollywood, is home to five of the Ahmanson's productions this year, while *The Phantom of the Opera* continues in the Music Center theatre.

THE CALIFORNIA TECH

Volume XCI • Number iii
August 23, 1989

EDITOR
Paul Socolow

CRIME BEAT EDITOR
Chris Campo

PRODUCTION
Nick Smith

BUSINESS MANAGER
Sonny Arcilla

OFFICE MANAGER
Gavin D. Claypool

CIRCULATION
Peyjen Wu

THE CALIFORNIA TECH
40-58 SAC
California Institute of Technology
Pasadena, California 91125
(818) 356-6154

Published weekly except during examination and vacation periods by Associated Students of the California Institute of Technology, Inc. The opinions expressed herein are strictly those of the authors.

Letters and announcements are welcome. All contributions should include the author's name and phone number and the intended date of publication. The editors reserve the right to abridge and edit letters for literacy, expediency, or else.

Turn in copy (preferably in WordStar format on an IBM-compatible floppy disk) to the Tech mailbox outside SAC room 40. The deadline for copy is Wednesday at noon; for announcements, Tuesday at 5 P.M.

Subscription requests should be directed to the office manager. Subscriptions are \$3.50 per term, \$9 for one year, \$17 for two years, \$24 for three years, and \$30 for four years. Life subscriptions are available for \$125.

Printed by News-Type Service, Glendale.

ISSN 0008-1582

CALTECH AUTHOR

Thomas R. McDonough

SPACE

THE NEXT TWENTY-FIVE YEARS



SPACE

The Next Twenty-Five Years

Thomas R. McDonough



"... shows us where we've been, where we are and where we might be headed next, and does all three wonderfully well."

—The West Coast Review of Books

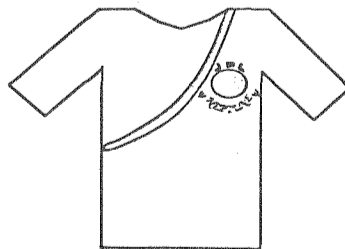
Now in Paper! Revised and Updated!

John Wiley and Sons

\$12.95

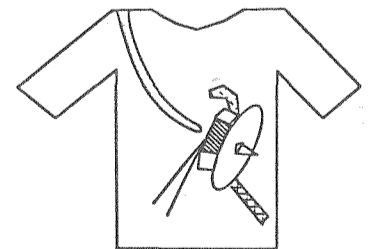
CELEBRATE THE NEPTUNE ENCOUNTER AT THE CALTECH BOOKSTORE!

Book signing with
DR. BRUCE MURRAY
author of *Journey into Space*
Thursday, August 24, 1-2 p.m.



Front

We carry the
"Bon Voyager"
T-Shirt!

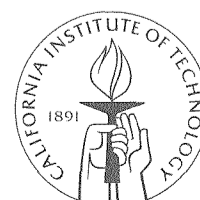


Back

BOOKSTORE SERVICES INCLUDE:

- Photo Processing
- Out of Print Book Searches
- Worldwide Shipping
- Air Mail Delivery of Rush Orders
- We Special Order Books, Calculators, and Supplies

Caltech Bookstore
Mail Code 1-51
Pasadena, CA 91125
(818) 356-6161



Open: Monday-Friday
8:15-4:30

The Team to Beat

Person	Nickname	training shoes	racing shoes	best	worst	est.	Person	Nickname	training shoes	racing shoes	best	worst	est.
<i>Three biggest accomplishments</i>						miles/	<i>Three biggest accomplishments</i>						miles/
<i>Worst moment</i>						week	<i>Worst moment</i>						week
Dan Flees	Flying Fleester	Air Pegasus	Waffle Racers	27:57	32:08	35	Andre Ohanissian	The biathlete who couldn't run	Eagles	Waffle Racers	35:10	42:27	0
<i>Second team all-conference, 16:20 5K, most valuable newcomer</i>							<i>DNSU Caltech triathlon, flat tire at Oliveview biathlon, broke collarbone riding bike</i>						
<i>Interhouse 3000</i>							<i>Went to the bathroom while running KELROF</i>						
Scott Kister	The Downhill Dasher	Gel-Lyte	Thinclad II	28:28	32:25	60	John Raguin	RAGS	Gel-Runners	?	32:06	38:51	0
<i>Paul Barthel Award, 11th in marathon, ran in State CC meet</i>							<i>1:59.99?? 800 in HS, paced winning KELROF team, left Caltech</i>						
<i>State CC meet</i>							<i>Didn't break 2:00 in 800 in college</i>						
Chris Campo	The Roadrunner	Gel-Lyte II	Gel Racers	30:35	33:37	50	Steve McLaughlin	The Stud	Gel-Lyte II	Air Flow	36:50	41:16	45
<i>12th in marathon, 16:44 5K, KELROF</i>							<i>Beat Mahon on bike in Caltech triathlon, beat Andre in cross-country race</i>						
<i>33:57 at Regionals</i>							<i>Lost to Andre in CC race</i>						
Mark Lyttle	Motorin' Mark	Epirus	Duelists	31:13	35:36	35	Eric Stout	Super Stout	Gel 101	Davila's spikes	37:19	40:44	10
<i>2nd Oliveview Biathlon, winner Caltech 'biathlon', competed in national biathlon championship</i>							<i>Edged Troy Brown in 800, 2:15 800</i>						
<i>12:08 steeplechase</i>							<i>40:44 in CC race</i>						
Kurt Storm	STORM	?	?	31:30	39:48	35	Chris Goddard	Goddard the Ghost	Adidas	?	35:51	38:32	20
<i>Permanent 7th man, ran at Regionals, most improved runner</i>							<i>12 400's at 65 in HS practice, 4:52 1500, beat Jerri in 800</i>						
<i>Lost shoe in Interhouse 800</i>							<i>Worse time than Jerri in 1500</i>						
Mike Mahon	Harry	Gel-Runner	?	30:55	34:41	5	Rich Dissily	Rockin' Rich	Road Warriors	Jayhawks	29:13	29:13	60
<i>2:11 800, 4:30 1500, ran at Regionals</i>							<i>Beat Joe Falcon, 3:45 1500, 5K split in 10K race beats Kathy's 5K</i>						
<i>19:31 5K</i>							<i>Did not qualify for the Jack in the Box meet</i>						
Paul Socolow	The Overtrainer	GT II	?	32:17	36:53	10	Jerri Martin	Jammin Jerri	Gel-Lyte II	Gel-Racer	19:07	20:55	0
<i>Qualified AAU nationals HS 400 hurdles, broke 60 400 hurdles, had 3rd most points on track team despite being ineligible 3rd term</i>							<i>5th in HS state meet with 5:03 mile, 3rd conference in CC, 2nd in SCIAC in 1500, 3000</i>						
<i>Dropped off the winning KELROF team</i>							<i>Choked at CC Regionals</i>						
Derek Slye	The Slyster	GT III	GT III	34:15	37:55	35	Kathy Kanen	Killer	Gel 101	Duelists	16:19	?	50
<i>5th in Renfair Roadrace on his stolen unicycle, top 7, 18:20 5K</i>							<i>16:19 5K, 9:20 3000 at Mt SAC, held course record at LA's fastest 5K</i>						
<i>Currently ineligible</i>							<i>Spiked and embarrassed by Suzy Favor</i>						

LAEMMLE THEATRES

ESQUIRE
2670 E. Colorado Blvd.
(818) 793-6149

Cheetah

Daily 4:45, 7:00, 9:00 p.m.
Sat-Sun matinees 12:30, 2:30 p.m.

Starts Sept. 1:
A Chorus of Disapproval

COLORADO
2588 E. Colorado Blvd.
(818) 796-9704

"Two Thumbs Up!"
—Siskel & Ebert

sex, lies and videotape

Daily 5:20, 7:30, 9:40 p.m.
Sat-Sun matinees 1:00, 3:10 p.m.

CLASSIFIED ADS

FOR SALE—

IS IT TRUE you can buy jeeps for \$44 through the U.S. government? Get the facts today! Call (312) 742-1142 ext. 9718-A.

HELP WANTED—

DEPENDABLE, RELIABLE full-time child care needed. Caltech area. Transportation preferred. Call days: (818) 397-7131, night: (818) 577-7625.

RATES \$3.00 for first 25 words;10¢ for each additional word. Send written ad with payment to 40-58. Deadline is 6 p.m., Monday before issue. No charge for on-campus lost & found.

MANDARIN CUISINE & SEAFOOD

ENJOY A DELICIOUS MEAL ESPECIALLY PREPARED FOR YOU BY OUR AWARD-WINNING CHEF

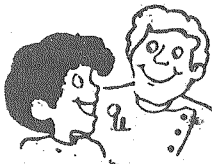
LUNCH SPECIAL CLASSIC DINNERS
11:30 a.m. to 3 p.m., from **3.95** Sun-Thurs 3-10 p.m.
Choice of 13 Entrees **3.95** Fri-Sat 3-10:30 p.m.

EARLY BIRD DINNER SPECIAL
3 p.m.-7 p.m. DAILY ONLY **4.95**
Choose from 13 items

2475 East Colorado Blvd. (818) 449-8018
(between Altadena Dr. & Sierra Madre in Pasadena)
Free Parking in Rear • Open 7 Days • Cocktail Lounge • Food to Go Welcome



HAPPY HOUR at the dentist?



See Dr. Richard S. Phillips, D.D.S.
1302 North Altadena Drive
Pasadena • 797-6778

New Patient HAPPY HOUR SPECIAL (Tues. & Thurs., 2-6 p.m.)
Cleaning/Exam \$18.00 (reg. \$70.00)

expires 6/16/89

CHANDLER DINING HALL

The Best Food for the Best Price

Breakfast Special

Bacon, ham, or sausage
Two eggs
Hash browns
Toast and jelly



For Only **\$1.95**

Fried Chicken Special

3 pieces of fried chicken
French fries
Salad bar



For Only **\$2.25**

LORENZO'S BARBER SHOP

Unisex Hairstyling *Ask for Your Caltech Student Discount!*

Regular Cut (men)	\$ 7 ⁰⁰	\$1 off
Regular Cut (women)	\$ 8 ⁰⁰	\$1 off
Style Cut	\$12 ⁰⁰	\$2 off
Permanent Wave	\$40 ⁰⁰	\$5 off

9 a.m.-6 p.m., Monday-Saturday (818) 795-5443
14 N. Mentor Avenue, Pasadena No Appointment Needed

Open Monday-Friday
7 a.m.-2 p.m.

"Catch of the Day"
Daily Fish Special



For Only **\$2.25**



20% OFF
with this coupon
Private tub rental,
Sunday - Thursday

expires 9/30/89

PUDDINGSTONE HOT TUBS RESORT
Reservations & directions: (714) 592-2222
Frank G. Bonelli Park in San Dimas

Voyager T-Shirts

A colorful T-shirt commemorating Voyager 2's encounter with Neptune has been designed and is being promoted by three JPL student interns.

Vijay Kirsh, Dave Schleicher, and Rohan Zaveri came up with the idea during lunch at the JPL cafeteria. "We wanted something with an artistic influence that would capture the spirit of the encounter," Zaveri explained.

The four-color front features Neptune (complete with Great Dark Spot and southern band), the JPL logo, and an abstract rendering of Voyager's trajectory. The trajectory streak continues onto the three-color back, where the Voyager spacecraft is pictured and the words "bon Voyager" appear.

According to Krish, the streak is intended to pique interest. "You see the front of the shirt and think 'what the ehck is that?' It makes you want to see the back." The words were chosen because Voyager is "saying goodbye to the solar system," Schleicher added.

The shirts are available at the Caltech bookstore. They will also be sold outside Beckman Auditorium and Baxter Hall during this week's evening encounter sessions, through Saturday.

Schleicher and Zaveri are both in the master's program in Aeronautics and Astronautics at Stanford. Krish is a senior at MIT studying Mechanical Engineering.

Voyager's Neptune Timetable

(Earth-received time, P.D.T.)

Thursday, August 24

9:05 p.m. Closest approach to Nereid

Friday, August 25

12:09 a.m. Inbound ring-plane crossing

1:06 a.m. Closest approach to Neptune

2:36 a.m. Outbound ring-plane crossing

6:20 a.m. Closest approach to Triton

Times are approximate and subject to change, due to course adjustments used to fine-tune the Voyager's approach to Neptune.

New Additions

Jeanine Conneally is the new Student Activities Coordinator.

Dan Bridges is the new Athletic Director.

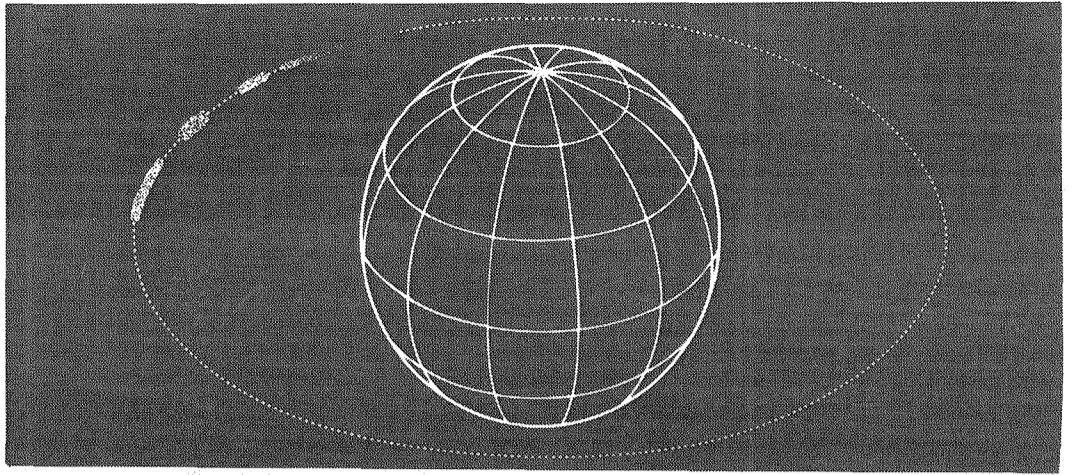
Rhonda MacDonald '74 is the new president of the Alumni Association.

Gary Lorden is the new Vice President for Student Affairs.

Bernice Reda is the new Administrative Assistant and Acting Executive Director for the Y.

Abigail Collett is the new baby in the Master's Office.

A graphic illustration of the ring arc discovered by Voyager 2 circling the planet Neptune.



Voyager Activities

Wed., Aug. 23, 7-9 p.m.
Pasadena Civic Auditorium

Thu., Aug. 24
Ramo Auditorium, 9 a.m.-11 p.m.
Baxter Lecture Hall, 1-11 p.m.

Thu., Aug. 24, 1-2 p.m.
Caltech Bookstore

Thu., Aug. 24-Mon., Aug 28
Pasadena Center/Holiday Inn

Fri., Aug 25
Ramo Aud., 8:30 a.m.-11 p.m.

Fri., Aug 25-Sun., Aug. 27
Pasadena Conference Center

Sat., Aug. 26, 8 a.m.-11 p.m.
Beckman Auditorium

Voyager Retrospective Symposium. Carl Sagan, Bruce Murray, Ed Stone, William Goetzmann. Tickets \$3.

Voyager Neptune Watch. Free, open to public.
Beckman Auditorium, 6-11 p.m.
Pasadena Conference Center, 6 p.m.-6 a.m. (Fri.)

Book Signing. Dr. Bruce Murray will sign copies of his new book, *Journey into Space*.

Students for the Exploration and Development of Space Conference. Open to students, \$30 registration.

Voyager Neptune Watch. Free, open to public.
Beckman Auditorium, 5-11 p.m.

Planetfest '89. Three days of displays, exhibits, speakers, art show, film festival, etc. Tickets (adults/students) are priced at one-day: \$7/\$5; two-day: \$12/\$8; three-day: \$15/\$10.

Voyager Neptune Watch. Free, open to public.



PUDDINGSTONE HOT TUBS RESORT

Open year 'round

"Happy Hour"

1/2 Price Tub Rental • 5-7 p.m. Daily

Hours: Sunday-Thursday, noon to midnight
Friday-Saturday, noon to 2 a.m.

Reservations & directions: (714) 592-2222
Frank G. Bonelli Park in San Dimas

O'PATAYA CAFE

— FOR THE STUDENT —
Spicy Thai Cuisine
to Polish the Soul
5% Discount with Student ID

STUDENT'S LUNCH
— Build Your Own —
As Many As 15 Thai
Delicacies to Choose From **\$2.99** & Up

NOW OPEN SUNDAY 11 a.m. - 2 p.m. • 5 p.m. - 9 p.m.
OPEN 11 a.m. - 10:30 p.m. Monday-Saturday

PLENTY OF FREE PARKING
1525 E. Colorado Blvd.
across from PCC
(818) 356-0404

GOLDEN GLOBE

PARIAN TRAVEL
Caltech Officially Approved

Most professional, courteous, economical and efficient service
for your **official** and **personal** travel needs.
Free service to you.

Airlines, Cruises, Tours, Hotels, Car Rentals.
Individual, Commercial, Groups.
(818) 577-8200
468 S. Sierra Madre Boulevard, Pasadena

ACADEMY BARBER SHOP

27 N. Catalina Ave., Pasadena
Open Tues.-Sat., 8 A.M.-5 P.M.
449-1681

Rag Time on Green

RESALE CLOTHING
for
WOMEN

1136 E. Green St. • Pasadena
(818) 796-9924
Mon 10-6 • Tues-Thurs 10-5 • Fri-Sat 10-3

Sam Custom Tailor

3519 E. COLORADO BLVD
PASADENA
(818) 793-2582

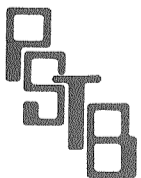
Hours: 9:00 a.m. - 7:00 p.m.

TAILORING for
LADIES & GENTLEMEN
ALTERATIONS
RE-STYLING
INVISIBLE REWEAVING

Special rates for Caltech/JPL community

30% OFF ALL USED BOOKS

offer expires 8/31/89



PASADENA SCIENTIFIC & TECHNICAL BOOKS

1388 E. WASHINGTON BLVD.
PASADENA, CALIFORNIA 91104
(818) 794-4499

COMPUTER SCIENCE • ARTIFICIAL INTELLIGENCE
MATHEMATICS • PHYSICS • ENGINEERING
BIOLOGY • CHEMISTRY • MEDICAL
HANDBOOKS • DICTIONARIES

Contact us for additional titles in these or other scientific areas. We have a large selection of reference books, and we specialize in all scholarly & professional book categories.

Special orders • 1-3 weeks delivery
Rush orders by air • \$10 extra
We order worldwide



LOCATED JUST 2 MILES
NORTH OF CALTECH
NEAR HILL AVENUE



La Grotta di Capri Pasta House

Discount with Caltech ID:

Dinner for 2 for \$11.95

includes pasta dish
with soup or salad
and selected dessert

Ask for the summer dinner special

(818) 796-7652

1770 E. Colorado Blvd.

Pasadena

(parking in rear)

LOWEST AIR FARES

Atlanta	\$238.00 RT
Chicago	\$179.00 RT
New York	\$278.00 RT
Phoenix	\$ 38.00 RT



Bangkok	\$796.00 RT
Bangladesh	\$996.00 RT
India	\$1165.00 RT
London	\$665.00 RT
Paris	\$668.00 RT
Tokyo	\$536.00 RT

More lowest fares are available. Prices are subject to change.

Call (818) 794-0210

FREE WORLD TRAVEL