



Vol. 19 No. 1

The Summer Science Program

# UNIVERSAL TIMES

November 2000

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## RE-CONNECT WITH SSP

- ? Visit the web site at [www.summerscience.org](http://www.summerscience.org)
- ? Subscribe to the alumni email discussion forum
- ? Tell local science and math teachers about SSP (and refer them to our web site)
- ? Plan to visit Ojai during reunion weekend, July 14
- ? Send an email about how the SSP experience influenced you to <alumni@summerscience.org>
- ? Send a tax-deductible donation (see page 7)
- ? Volunteer your time

## SSP 2000 MAKES HISTORY

"The more things change, the more they stay the same." That cliché applies to SSP 2000, the first to be held under the auspices of alumni-led Summer Science Program Inc., at Happy Valley School in Ojai. Twenty-four bright teenagers learned the joys of sleep deprivation and true teamwork as they fought their way to orbit determinations for their asteroids ... in only five weeks!

The class was smaller than usual to compensate for the compressed schedule and for the stress of late-night treks by van to the dome at Thacher. But as you can tell from the students' comments (see margins inside), the essential SSP experience survived the transition to a new campus. Next summer we will return to Happy Valley School, with the traditional six-week, mid-summer schedule and 30 participants.

SSP was already one of the longest-running and most prestigious pre-college science programs in the world. It is now the only one (as far as we can tell) that is managed, controlled, and largely funded by its own alumni.

Your board of directors is working to acquire observing equipment (from Thacher and elsewhere), researching possible curriculum changes, and building a base of financial sta-

bility through grants and sponsorships.

Alumni participation will again be the key. SSP now operates without the financial safety net of a large sponsoring institution, and counts on your generosity to fund over half of the operating budget. See page 2 for more information on where the money comes from and where it goes.

On to 2001!



Welcome to our newest alumni, the Class of 2000!

## ACADEMIC DIRECTOR'S REPORT

BY DR. TRACY FURUTANI '79

On August 30, the Summer Science Program completed a successful, if stressful, 42nd year. The students and TA's had become a close-knit group of friends under the pressure of this intense but rewarding five weeks. They had focused their intellectual and physical energies exceptionally well,

given the shorter duration of the program and the occasional wait for access to the PC's. All eight teams finished their observations and plate measuring; all 24 students completed the OD.

Joining the SSP family as our new Associate Academic Director was **Dr.**

**Mark Hammergren.** Dr. Hammergren's "regular job" is Postdoctoral Researcher at the Institute for Geophysics and Planetary Physics at Lawrence Livermore National Laboratory, specializing in asteroids.

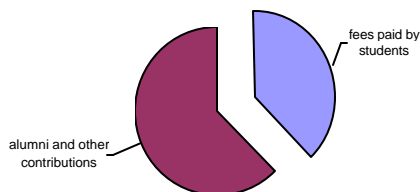
Five teaching assistants

(Continued on page 2)

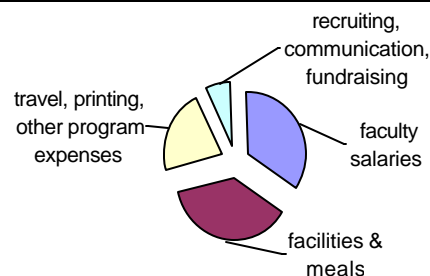


Team 6 heads for the dome.

## SOURCES AND USES OF FUNDS



Of the approximately \$104,000 spent in FY 2000, 62% came from contributions, and 94% of those contributions came directly from alumni (or their employers via matching gift programs). Donations are welcome from any source and for any amount.



This shows where the \$104,000 went. (Not shown is the \$15,000 we offered in need-based financial aid, which is not a cash expense.) Next year's budget will be about 30% higher due to 6 more students and one additional week.

## SSP IN MARCH SKY & TELESCOPE

Look for a full-length feature article about SSP in the March 2001 *Sky & Telescope* magazine (distributed

in late January). Academic Director **Dr. Tracy Furutani '79** describes SSP's history, curriculum, and re-

cent transition. Thanks to **John Briggs '76** (a former *S&T* editor) for arranging this great publicity!

### SSP 2000'ERS ON: HAPPY VALLEY SCHOOL

*"it's a gorgeous site ... I love the magnificent scenery"*

*"I'd do ten more OD's just for the food"*

*"campus was great — couldn't imagine it better"*

### THE UNIVERSAL TIMES

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### ACADEMIC DIRECTOR'S REPORT

(Continued from page 1)

worked with the students day and night: lead TA **Madison Compton**, senior TA **Amy Barr '94**, **Aditi Chandra '95**, **Sayuri Desai '87**, and **Henry Kim '95**.

Dr. Hammergren and I had 15 lectures apiece to teach the math and science that students would need for their asteroid OD's. And, as in the past, we wanted to teach additional interesting material that was not directly needed for the OD.

Dr. Hammergren handled the astronomy: coordinate systems and astronomical time, precession, parallax and proper motion, basic observational astronomy, orbital motion and interplanetary trajectories, methods of orbital determination, an introduction to asteroids, and a primer on science ca-

reer trajectories.

I covered math topics including plane trigonometry, significant figures, spherical trigonometry, limits and differential calculus, vectors, matrices and integral calculus. My physics lectures discussed laws of motion and falling bodies, mechanics, circular motion, work and energy, and gravitation. We tied together math and physics by introducing conservation principles to find equa-

tions of motions for rotating and revolving objects. Finally, we concluded with discussions of statistics and best-fit regression methods. For dessert we served plate tectonics, petroleum genesis, spectroscopy, special relativity, and hurricanes.

The TA's also gave lectures on various topics of interest to them, doing an excellent job of engaging the students.

Observationally we were

(Continued on page 3)



The Happy Valley School campus in the mountains near Ojai.

# GUEST SPEAKERS 2000

A special thanks to our guest speakers (listed in alphabetical order):

"Project Stardust": **Dr. Donald Brownlee**, Prof. of Astronomy, Univ. of Washington

"Use of the Global Positioning System (GPS) for Earthquake and Plate Tectonic Studies": **Dr. Andrea Donnellan**, Sr. Scientist, JPL

"Tracking Mammoths and Mastodons: Using Chemistry to Reconstruct the Past": **Dr. Kathryn Hoppe**, Postdoctoral Research Fellow, U.C. Berkeley

"Bad Science in the Film *Deep Impact*": **Keith Howington**, CEO, Logix Corp.

"Meteorites and Asteroids: What Do We Really Know?": **Dr. Tony Irving**, Prof. of Geological Sciences, Univ. of Washington

"Unleashing Minds for Navigating the Future" (reunion day address): **Dr. Paul MacCready**, CEO, AeroVironment, Inc.

"Confessions of a Former Math Geek" (program closing address): **Julie Pottinger**, novelist

"Gamma Ray Bursts": **Dr. Maarten Schmidt**, Prof. of Astronomy, CalTech

"Mad Science Show": **Dr. Larry Sverdrup**, Scientist, Trex Enterprises

"Money, Sex, and Fear: Financial Markets and Mating Strategies from the Perspective of Risk Aversion": **Lee Van Slyke '64**, CEO, Capital Management Technology

"Radio Astronomy and the Search for Dark Matter": **Andrew West '94**, Graduate Student, Univ. of Washington



*"SOTS Day" (Something Other Than Science) at SSP 2000*

## ACADEMIC DIRECTOR'S REPORT

*(Continued from page 2)*

dogged by equipment problems, starting on the very first night of student observing. The astrograph's sky tracking broke down, before even one group had taken a plate. Observing was suspended until the telescope could be fixed.

After a week of not understanding this intermittent problem, we called for help. The response was heartening. **John Briggs '76** of National Solar Observatory in New Mexico put out an Internet SOS that introduced us to **Norbert Tackman**, a retired Navy electrical engineer and amateur astronomer from Ventura, who patiently traced the circuitry. He found that a wire to the guiding paddle had broken inside its insulation, due to repeated bending over two decades.

With that finally fixed, we ramped up the number of groups going up to the Thatcher dome each night so that five out of eight teams obtained three measurable plates.

For the others, we were able to obtain CCD images from Manastash Ridge Observatory (thanks to **Andrew West '94**) and from an amateur observatory.

Teams measured their plates on our two venerable measuring engines, which seemed none the worse for wear.

Orbit determinations occupied students day and night during the fourth and fifth weeks. Two students did the OD by hand, and the rest wrote OD programs using C. For most, as in past years, this was their introduction to computer programming.

Everyone calculated reasonable orbital elements, compared to published values; Dr. Hammergren and I were satisfied with their results.

I invited ten guest speakers to discuss subjects of their choice [see list above]. Field trips included excursions to Mt. Wilson and Jet Propulsion Laboratory. Former Academic Director **Dr. Stuart Stephens** thoughtfully arranged the JPL trip, including a visit to Mission Control.

To round out the activities, the TA's organized weekly beach trips, late-night pizza runs, numerous movie screenings, "SOTS" (Something Other Than Science) games out on the soccer field, and the student talent show.

## SSP 2000'ERS ON: WHY THEY CHOSE SSP

*"the program's reputation and promise to bring together the best & brightest students"*

*"a '99 alum called it 'mad tight'"*

*"it looked like the most valuable in the long-run"*

*"its history and reputation"*

*"it seemed more hands-on, more teamwork, challenging oneself to the limit"*

## OFFICERS &amp; DIRECTORS

Stephen L. Cotler '60,  
Chairman  
Charles H. Holland, Jr. '60,  
President  
John C. Rabold '70,  
Secretary and Treasurer  
Dr. Stuart K. Stephens,  
Vice-President, Academic  
Director Emeritus  
Richard D. Bowdon '74,  
Vice-President

SSP 2000'ERS ON:  
DESCRIBING SSP

*"the freedom and  
challenge made me  
realize my true  
potential"*

*"the most amazing  
experience of my life"*

*"the cooperation rather  
than competition"*

*"it has given me the  
confidence to aim higher  
in my college choices"*

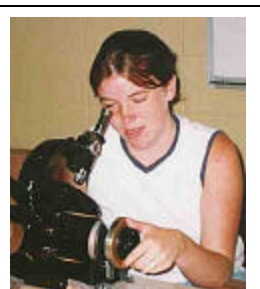
*"it changed me in a very  
positive way"*

*"quite simply, a life-  
altering experience"*

*"SSP—the smartest  
place to be"*

## SSP 99'ER WINS AWARD

Based on her OD of the asteroid 737 Arequipa at SSP '99, **Tiffany Titus** won



*Tiffany Titus '99*

second place in the Astronomical League's National Young Astronomer Award. She received a Meade telescope and a lifetime pass to the McDonald Observatory.

Says Tiffany: "This award gave me several opportunities to speak about SSP and what it has done for me. SSP has really made a difference in my life and I am forever grateful."

Tiffany now attends the Illinois Institute of Technology, majoring in aerospace engineering. For a copy of her research paper by email, email her at [titutif@iit.edu](mailto:titutif@iit.edu).

To learn more about the National Young Astronomer Award, visit the Astronomical League's web site at [www.astroleague.org/al/awards/nyaa/noya.html](http://www.astroleague.org/al/awards/nyaa/noya.html).

## NASA'S NEAR EARTH ASTEROID MISSION

BY DR. JANICE BISHOP '81, UT SCIENCE EDITOR

The Near Earth Asteroid Rendezvous (NEAR) Shoemaker mission launched in 1996 and has been collecting data from orbit around the asteroid 433 Eros since last February. NEAR-Shoemaker tells us that Eros is a primitive rock about 33 X 13 X 13 km in size and dates back to about 4.5 billion years. Eros is thought to be a good example of pristine material from the early days of our solar system. Its surface is heavily cratered, pitted and scarred from impacts with debris in the solar system. NEAR-Shoemaker has flown within 35 km of the surface of Eros and is scheduled to land on Eros next February.

Impacts have left more than a million boulders over 8 meters across. Eros is an undifferentiated and homogenous body. Its escape velocity ranges from ~3 to 17 m/s, which means that a ball thrown from the surface would escape the asteroid. A person weighing 150 pounds on Earth would

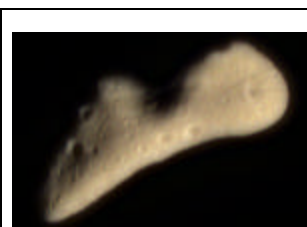
weigh about 1 ounce on Eros.

Most of the meteorites that fall to Earth are pieces of asteroids, although some are rocks from the Moon, Mars or other bodies. Scientists have been comparing the composition and abundance of meteorites with telescopic data of asteroids, in order to develop classification schemes. Asteroids deserve further study because meteorites and asteroids do not appear to match as well as they should.

NEAR-Shoemaker's near-infrared (NIR) and X-ray spectroscopes indicate that Eros is an S-type asteroid (contains metals, olivine and pyroxene) with a composition similar to that of meteorites called ordinary chondrites. This is different from the C-type asteroid (contains hydrated silicates and carbon), 253 Mathilde, observed by NEAR-Shoemaker previously. These up-close observations by NEAR-Shoemaker will

assist us in understanding asteroids and their association with meteorites and other bodies in our solar system.

Another reason to study near-Earth asteroids is to better understand the potential hazard of impact with Earth. Eros spent most of its life in the main belt, but has become a near-Earth object in astronomically recent times.



*Eros, taken 2/17/2000 by NEAR-Shoemaker.*

For more information on the NEAR-Shoemaker mission see <http://near.jhuapl.edu>

*Dr. Bishop '81, TA '86-87, is a Principal Investigator with the SETI Institute.*





Cut out this form and mail it with your check, payable to **Summer Science Program, Inc., 9198 Skyline Blvd., Oakland, CA 94611-1748**. Please correct your name and address, if necessary, on the back. To donate on-line using a credit card, go to [www.summerscience.org/contrib.htm](http://www.summerscience.org/contrib.htm)

I am enclosing my donation to the only independent science education program managed, controlled, and largely funded by its own alumni: ? \$25 ? \$50 ? \$100 ? \$250 ? \$500 ? \$\_\_\_\_\_

Earmark my donation for: ? Unrestricted ? Abell Scholarship ? Outreach ? Permanent Endowment

Printed name \_\_\_\_\_ SSP Class \_\_\_\_\_

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Note: the **CV Project** seeks to quantify the benefits of SSP for use in grant proposals, recruiting, and publicity. Over 200 alumni returned the CV Project form inserted into the last *Universal Times*. If you did, thanks; if not, please go to [www.summerscience.org/update.htm](http://www.summerscience.org/update.htm) and complete the form on-line. Results will be shown in the next *UT*.



## RECORD TURNOUT FOR REUNION DAY

BY RICHARD D. BOWDON '74

About six dozen alumni, former faculty, their families and guests joined the faculty and class of 2000 at for a delightfully full day of activities at Reunion 2000.



*Dr. Paul MacCready demonstrates one of his smaller inventions.*

Following an open board of directors' meeting, alumni joined the students for lunch. Then it was across the valley to Thacher to see

the grounds, dorms, and classrooms again.

The ballplayers among us returned before dinner for the traditional baseball game. The alumni came from behind to win, 10-7.

Happy Valley School put on a fabulous outdoor buffet spread, complete with sushi. A relaxed group then gathered in the theatre for the evening program.

**Dr. David Pierce** introduced the featured speaker, **Dr. Paul MacCready**. His fascinating talk would turn out to be one of the students' favorites of the whole program. SSPI President **Chuck Holland '60** then pre-

sented plaques of appreciation to longtime administrator **Roger Klausler**, former Academic Directors in attendance **Graydon Bell**, **Catalin Mitescu**, **David Pierce**, and **Stuart Stephens**, and founding AD **Paul Routly**.

After dark, many alumni returned to Thacher to look through the old 'scope one more time.



*Alumni young and old rekindle memories visiting Thacher School dorms.*

*"Over the last decade I was ever more strongly drawn to the reunion of the SSP, and finally made the trip down this year. It was great meeting other alumni, but especially spending time with the current students."*

—Ron Chestnut '63

*"Both Nicole and I were absolutely delighted with our day at SSP, and want to congratulate the Board for arranging this reunion with such panache."*

— Dr. Catalin Mitescu

*"Thank you very much for such a beautiful plaque. I think SSP was the best thing I've done with my life."*

—Dr. David Pierce

## BAY AREA REUNION ALSO A SUCCESS

Not everyone could make it to Ojai on Reunion Day. So **Alan Keeley '59** took the initiative to organize a Bay Area reunion, held in September at the Westin Palo

Alto. Directors **Steve Cotler '60** and **John Rabold '70** reported on future plans. John's classmate **Dr. Richard Nolthenius '70** described Earth's possible

fates in his talk on "Death and Mayhem from the Stars".

Why not consider organizing a reunion in your area?

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SSP 2000'ERS ON:  
WHY SSP IS VALUABLE

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*"showed me that I can  
push myself"*

*"the friendships forged"*

*"the social interaction,  
the cooperation rather  
than competition"*

*"it has given me the  
confidence to aim higher  
in my college choices"*

*"working with so many  
amazing students was  
humbling but healthy"*

*"teamwork, how to  
think"*

*"it changed me in a very  
positive way"*

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## HELP THE SSP STUDENTS OF TOMORROW

BY JOHN RABOLD '70, TREASURER

With the end of the year approaching, please consider making a tax-deductible contribution in support of SSP. Many alumni make an annual donation; if you haven't lately, why not start the habit this year?

I saw first-hand last summer how SSP continues to inspire and challenge today's teenagers. Your support will help kids share this experience into the future. Those students are out there — we must not let them down.

Every donation is important. Our income tax exemption requires broad support (the IRS won't let us rely on a

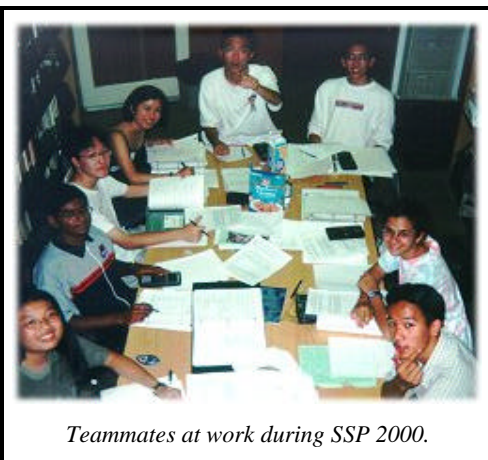
few large gifts). And widespread alumni support helps prove SSP's value when we apply for outside funding.

There are several ways you can help:

- Complete the clip-out form on page 7 and mail it in with your check
- Contribute by credit card at [www.summer-science.org/contrib.htm](http://www.summer-science.org/contrib.htm)
- Ask your employer to

match your gift

- Contribute appreciated securities (see below)
- Make a bequest in support of SSP in your will



*Teammates at work during SSP 2000.*

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## CONTRIBUTING APPRECIATED SECURITIES

If you own stocks or bonds that have appreciated, consider giving them to support SSP. Here's why: if you sell the shares, you'll have to pay income tax on the gain. But if you contribute them directly

to Summer Science Program, Inc., you can **deduct the entire current value** on the date of the gift, and you avoid paying any income tax on the gain ... forever.

Feel free to contact Treasurer

**John Rabold '70** for more information about this painless way to enhance the value of your gift to SSP. You can reach John at [<jrabold@summerscience.org>](mailto:jjrabold@summerscience.org) or (510) 333-2112.