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The Summer Science Program

UNIVERSAL TIMES

Fall 2005

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MEMOS

- Remember SSP as you plan your year-end charitable donations. Mail in the form on page 7, or visit www.ssp.org/donate to use a credit or debit card.
- Check out the new online alumni database. Click the Alumni tab at ssp.org.
- Thanks again to **Research Systems, Inc.** (www.rsinc.com) for use of their IDL programming language, and **Software Bisque** (www.bisque.com) for The Sky and CCDSOFT software!
- Mark your calendar now for 2006 Reunion Day: **July 8** in Socorro, **July 15** in Ojai.

UNDERSTANDING THE "MAGIC IN THE BOTTLE" WHAT IS SSP, EXACTLY?

It's been called "the magic in the bottle" – the combination of curriculum, facilities, faculty, and sense of community that made SSP one of the longest-running and most successful summer enrichment programs in the nation. Six summers ago SSP moved across the Ojai Valley from Thacher School to Happy Valley School. It was an experiment: could the Thacher experience be transferred? It was a great success...so three summers ago we opened a second campus at New Mexico Tech in Socorro.

Our goal has been to change as little as possible, but inevitably SSP has

evolved, as a result of moving, expanding, and simply with the changing times.

With that in mind, SSP's Board of Trustees has launched a multi-pronged effort to understand thoroughly the essence of SSP, and to plan for the long term. They've started with three big questions, and formed a committee to answer each.

VALUES

What values, attitudes, and specific traditions make SSP a unique and rewarding experience for both students and staff? What essential ingredients created 40 years of stimulating intellectual and social atmosphere

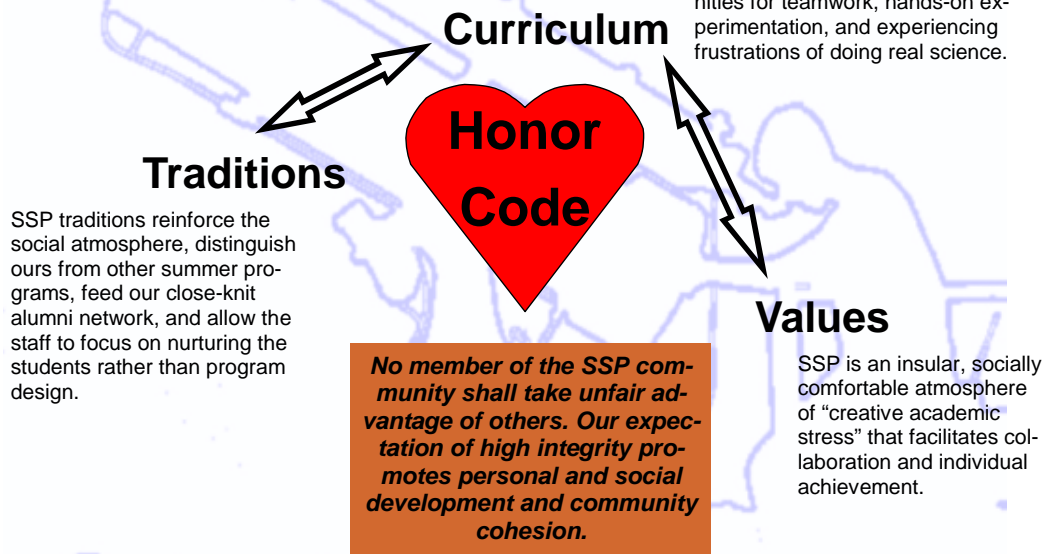
at Thacher School, and to what degree are they portable to other campuses?

The **Values Committee** is charged with documenting SSP values, culture, and traditions. Dr. Amy Barr '94 (TA '99, '00, '02) will chair, with members Mitch Kapor '66, Henry Lichstein '60, and Roger Klausler (administrative director '82-'99). This committee anticipates asking for input from former staff, and reporting back to the Board at its meeting in February.

CURRICULUM

Eventually, SSP will have to transition to all-digital imaging, and leave film astro-
(Continued on page 2)

The SSP Culture revolves around our honor code, and includes our curriculum, 47 years of tradition, and educational values.



By Dr. Amy Barr '94, TA '99, '00, '02



Some Things Never Change Dept.: Using the Mt. Wilson measuring engine, once used by Edwin Hubble himself

PARENTS SAY

“For the first time in her life, Mary was surrounded by her peers. She has quit saying ‘I’ll never get into MIT...’ She will move heaven and earth to get back in that environment -- it was home for the first time. She doesn’t do homework to get an ‘A’ anymore. Yesterday, she was deriving the Bernoulli differential equations in her chemistry book just for fun. Thanks, SSP!”

—John Masterman

“My daughter returned a more mature and confident young lady. Thanks for keeping programs such as this alive and well.”

—John E. Bishop, M.D.

WHAT IS SSP, EXACTLY? *(continued from page 1)*

photography and measuring engines behind. What are the pros & cons of making that transition sooner rather than later (perhaps even for 2006)? How can we compensate pedagogically when students use more software and less hands-on hardware for data collection and reduction?

The **Experimental Curriculum Committee** includes Carel Veenhuyzen '69 (TA '75, '77) as chair, with Dr. David Pierce (faculty '74-'86), John Briggs '76, Dr. Dan Seligson '71, Chuck Holland '60, and Dr. Tracy Furutani '79 (faculty '99-'05), with additional input from other recent faculty. It will recommend to the Board whether to retain both analog and digital equipment and processes, or go to an all-digital program, and either way,

recommend the appropriate telescopes and other equipment. This decision must be made in November so new equipment can be ordered in time for SSP 2006.

FUTURE EXPANSION

It's difficult to find a campus suitable for SSP. It must be relatively isolated yet accessible, have good housing, dining, computing, and observing facilities, **plus** dark skies.

Given that other branches of science currently attract more attention (and funding), one wonders: what components of SSP's design could be ported to a completely different central project? What would that program look like, and could it be as successful?

SSP Chairman Steve Cotler

'60 is chairing a new initiative called **Program E** to port the SSP model to a student project involving energy or the environment. Two other Trustees are assisting, Dan Seligson and Tim McCarthy '59. Steve has recruited an all-star Steering Committee, including Dr. Donald Kennedy (*Science* magazine editor and former Stanford President), Dr. Steven Koonin (Chief Scientist of BP and former Caltech Provost), Dr. Ernest Moniz (head of MIT's Energy Lab and former Undersecretary of Energy) and three other prominent academic leaders not previously associated with SSP.

This group will raise funding independent of the traditional SSP, so that this initiative can only have a positive financial impact on the rest of the organization.

CURRICULUM COMMITTEE INTERIM REPORT

This Committee will recommend to the Board of Trustees changes in how the asteroid orbit determination project is performed, and what equipment will need to be purchased. The key question is whether to continue to use analog astrophotography and measuring engines, or all digital images and techniques. In an interim report in September, they defined benchmarks by which to evaluate the options.

The asteroid orbit determination project should:	Relative Importance
Require collaboration in teams <i>Collaboration is considered essential for most cutting edge research</i>	higher
Contribute to the body of scientific knowledge <i>In contrast to a laboratory exercise for instructional purposes only</i>	lower
Involve real-life “messiness” and ambiguity <i>In contrast to a canned textbook exercise that lacks uncertainties</i>	higher
Utilize techniques and instrumentation in use by scientists today <i>In contrast to obsolete techniques and instrumentation</i>	lower
Use the scientific method to work through a problem from start to finish <i>including hypothesis generation, data collection, reduction, and analysis, producing a quantitative result that is compared with a predicted result</i>	lower
Involve hands-on (possibly “hands-dirty”) experimental work	higher
Be challenging but also achievable by intense focus <i>Given the typical skills and experience of the target SSP students</i>	higher
Require students to acquire new skills and knowledge <i>E.g., applied math, physics, astronomy, and computer programming</i>	higher
Utilize equipment and supplies that are available, affordable and supportable	higher
Be appealing and attractive to teaching faculty	higher

PARENTS SAY

“Many thanks for Masha’s happy and inspired face when we met her at the Boston airport after SSP. What seemed impossible considering the workload, late night study, and all-night observations was her confident, relaxed, and healthy appearance. Masha still has that ‘airport’ expression on her face when she talks about SSP.”

—Lera Baru and Igor Baryakhtar



Outside Driscoll Hall, SSP’s dorm at New Mexico Tech

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Class of 2004 Colleges

Amherst	Jonathan Tucker
Cal Poly SLO	Francesca Lettang
Caltech	Rico Chiu, Jason Hernandez, Brian Sampson
Carnegie Mellon	Richard Halstead
Case Western	Kate Oldak
Chicago	Emma Lipari
College of DuPage	Michael Pogwizd
Columbia	Marshall Fox, Chris Haueter
Hampshire	Matthew Ragins
Harvard	Bethania Bacigalupe, Min Hwang, Christina Li, Ariadne Medler, Godelievre Ndunduyenge
Harvey Mudd	Camilo Brokaw, Mary Bush, Michael VanAntwerp
Johns Hopkins	Mireille Gomez
Kenyon	Tova Yoast-Hull
Lewis & Clark	Jeanine Fallen Bailey
MIT	Grace Cheung, Shuo Han, Robert Haussman, Suzanna Megyery, Vladimir Rosenhaus, Yunus Sasmaz, Jyotsna Venkataramanan, Lisa Wang, Helen You
Olin College of Eng.	Paul Mandel
Pennsylvania	Alex Herring
Pomona	Erik Kuefler, Irene Toro Martínez
Princeton	Nicole Clarke, Arthur Ewencyk
RPI	Eric Wilson, Mike Zuser
Rutgers	Nick Reed
St. John’s College	Kevin Andrus
Stanford	Joshua Chang, Josh Dillon, Lawson Wong
Swarthmore	Eric Astor
UC Berkeley	Jack Chai, Kevin Liu, Jimmy Tang
UC Santa Cruz	Vickie Martin
UCLA	Krystle Remmen
Univ of Craiova	Cristina Nitu
Univ of the Pacific	Adam Van Antwerp
USC	Sonya Hanson, Benedikt Riedel
Wellesley	Mary French, Christina Kim
Yale	Firat Erel, Daniel Marks, Erin Miller, Dilaver Velioglu



“Hey, programming is fun!” [not necessarily a literal quote]

2005ERS SAY

“SSP is a great opportunity to learn a lot of cool things about science and an even better way to learn about yourself.”

—Andy Eck

“Six weeks of work for six little numbers = the best summer I’ve ever had.”

—Patrick Holvey

“I learned how to pick two out of sleep, study, and social life.”

—Masha Baryakhtar

“SSP makes you aware of the bubble you may have been living in, and breaks you out.”

—Calvin Lee

“SSP rocks my socks.”

—Laura Chanan



Our dome at Etscorn Observatory with new control center.



Ojai Academic Director Dr. Tracy Furutani '79 talks geology at Wheeler Gorge

PARENTS SAY

Why was SSP so great? Simply put, for the first time Robert found himself with a group of peers who were highly intellectual and learning for the sake of pure knowledge, not for grades or accolades. He loved studying the principles of calculus and astrophysics during the day . . . and then putting them to use in a real-life observatory.

The instruction was top-notch, and the students also had plenty of fun. Robert came home literally gushing with excitement about college.

—Andrew P. Corty

GUEST SPEAKERS STAR AGAIN



Ojai Campus

- ★ Dr. Paul Pottinger, Univ. of Washington: "The Science of Malaria"
- ★ Dr. David Israel, SRI AI Center: "The Very Idea of a Computer"
- ★ Dr. Julian Krolik '66, Johns Hopkins: "How Black Holes Shine"
- ★ Dr. Larry Sverdrup, Ophthonix, Inc.: "Mad? Science"
- ★ Dr. Claudia Alexander, Jet Propulsion Lab.: "Looking at Comets Up Close & Personal with the International Rosetta Mission"
- ★ Dr. Jerry Nelson '60, UC Santa Cruz: "Segmented Mirror Telescopes, from Keck to TMT"
- ★ James Randi, James Randi Educ. Foundation.: "Search for the Chimera"
- ★ Dr. Tyrone Hayes, UC Berkeley: "One-hundred-eyed Giants, Hermes, and Zeus' Infidelity...What do these have to do with amphibians and pesticides?"
- ★ Dr. Gibor Basri, UC Berkeley: "The Search for Earth-sized Planets"
- ★ Dr. Judith G. Cohen, Caltech: "Stars as Nuclear Furnaces"
- ★ Dr. Melany Hunt, Caltech: "Booming Dunes and Other Granular Flows"
- ★ Stephen L. Cotler '60, SSP Chairman: Closing Address

Socorro Campus

- ★ Dr. Fran Bagenal, Univ. of Colorado: "The New Horizons mission to Pluto"
- ★ Dr. Paul Pottinger, Univ. of Washington: "The Science of Malaria"
- ★ Dr. Janice Bishop '81, TA '86-'87, SETI Institute and NASA-Ames Research Center: "Looking at Mars through a CRISM"
- ★ Dr. Uma Krishnamoorthy, Sandia National Lab.: "Micro-Electro-Mechanical Systems"
- ★ Dr. Galen Gisler, Los Alamos National Lab: "Calculations of the Asteroid Impact at Chicxulub at the End of the Cretaceous"
- ★ Dr. Gregory A. Lyzenga, Harvey Mudd College: "High Powered Rocketry for Fun and Learning"
- ★ Benjamin K. Roe, National Public Radio: "Claiming the Public Space: Public Radio in the Digital Media Age"
- ★ Dr. Louise Prockter, Johns Hopkins Applied Physics Laboratory: "The Messenger Mission to Mercury (It's not the humidity, it's the heat!)"
- ★ Dr. Penelope Boston, NM Tech: "Caves from Earth to Mars and Beyond"
- ★ James Randi, James Randi Educational Fdn.: "Search for the Chimera"
- ★ Kjerstin Williams, Caltech: "Swarming Robots"
- ★ Dr. Larry Sverdrup, Ophthonix, Inc.: "Mad? Science"
- ★ John Briggs '76, Phillips Academy: Closing Address





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It's safe and easy to donate on-line, using a credit or debit card, at www.summerscience.org/donate.

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REUNION FUN IN OJAI & SOCORRO

You may have noticed that on July 23rd, the sun set in the east. Well, maybe not, but students defeated alumni for the first time in SSP history. Or so they claimed.

With the temperature over 100F that afternoon, it was decided to postpone the game until after dinner and the guest lectures. Aaron Goldin '04 was on hand to describe his Grand-prize winning project in the 2004 Siemens Westinghouse Competition. Then Dr. Ty-

rone Hayes returned to SSP to report on his research on amphibians deformed by exposure to pesticides.

Afterwards, the softball game started—and was called on account of darkness after only three innings. Sure, the students were ahead, but it certainly wasn't an official game!

Six alumni from 2004, and most of the Board of Trustees, traveled to Socorro for Reunion. The Tech community joined us for James

Randi's talk on manifestations of pseudoscience. A fine time was had. (Mr. Randi traveled to Ojai the next day to lecture there.)



Aaron Goldin '04 answers students' questions about his winning science project.

2005ERS SAY

"The life change per day rate was higher than I ever imagined it could be. Thank you, you have profoundly affected my life for the better."

—Matt Bowes

"The people here are truly amazing. It feels like I've known them way longer than six weeks, and simultaneously as if I should be here six weeks longer."

—Anna deBakker

"... the epitome of camaraderie"

—Allen Yu

REPORT ON SSP 2005 (continued from back page)

In Socorro, the faculty persevered through various problems including cloudy weather, low motivation of some of the students, and the early departure of the Residential Director (replaced on short notice by Joe Bernstein TA '03, who flew out from Harvard for

two weeks of what we called "a little working vacation").

Everyone appreciated the improvements to "our" dome at Etscorn Observatory at NM Tech [see photo on p. 3]. The Socorro group again took field trips to the Very Large Array and White Sands Missile Range. This summer for the first time, they also made the long drive to Los Alamos National Lab for a behind-the-scenes tour. LANL has supported the Socorro campus with financial support and guest speakers since 2003. This year LANL also gave five full scholarships to New Mexican residents. Thanks are also due to Sandia National Labs

for doubling their support this year, and to Tech staff for their consistent support.

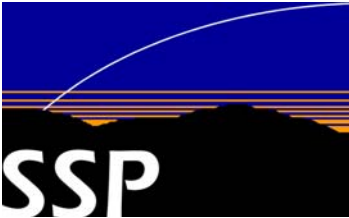
Comments written by the students from both campuses (some quoted in this UT) indicated that, as usual, the vast majority very much appreciated and benefited from SSP 2005.



The Very Large Array is Very Photogenic.



Visiting Caltech campus for the first time in several years.



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2005ERS SAY

“SSP is one of the best things that ever happened to me. It is the social experience that made a critical change in my development. The people here are smart, motivated, and talented.”

–Anh Nguyen

“Everyone is motivated to do their best. We are like a happy family.”

–Shiyu Bai

REPORT ON SSP 2005

The faculty of the 47th Summer Science Program delivered the customary “educational experience of a lifetime” to some of the world’s most promising young scientists, despite a number of challenges.

In Ojai, the venerable UCLA astrograph and mount suffered its usual quota of mechanical problems. Nevertheless, thanks to the persistence and ingenuity of

the faculty, students’ guiding success rate was the highest it has been for at least a decade. Digital images from the Meade telescope / SBIG CCD camera were fully integrated into the OD project. All of the students completed their orbital determinations, used the f and g series calculations to check their solar and asteroid vectors, and generated an ephemeris to check their orbital ele-

ments. A third of the students added a light travel time correction.

The Ojai group made its annual field trip to Jet Propulsion Lab, but this year substituted JPL’s Table Mountain Observatory for Mt. Wilson, and added a trip to Caltech campus where they were feted by administrators and visited labs.

(Continued on page 7)



Socorro Students & Faculty at Closing



Ojai Students & Faculty keep looking up